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THE OSTROPALEAN FUNGI[1]

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I. Introduction

The evolution of a scheme of classification for Ascomycetes whose asci are borne in open, more or less cup-shaped fruting structures has proceeded by a series of approximations. Each of these has gained currency for a time and then gradually fallen into disuse, leaving behind a legacy of generic names which are either incorporated into the succeeding system, ignored, or abandoned.

This paper traces the nomenclatoral and taxonomic history of the Stictidaceae, and outlines a set of characters by which genera formerly assigned to that family may be redisposed in a manner compatible with current standards of classification. An emended concept of the order Ostropales, to which many of the genera belong, is presented, and the relationships of the order discussed.

The proposed system of classification is morphological, and is, where possible, based on principles of predictive value and utility. Attempts have been made to make generic delimitations in the Stictidaceae compatible with those in other groups by stressing those characters considered important elsewhere in the Ascomycetes.

II. Historical Background

The small, saprophytic fungi which comprise the Stictidaceae attracted little attention before the beginning of the nineteenth century. *Stictis radiata* may have been formally described by Linnaeus, although the identity of *Lycoperdon radiatum* L. is questionable. Official recognition of the group came in 1799, when Persoon erected the genus *Stictis*, with three species, two of which were immersed discomycetes. The third was considered atypical and was soon transferred to *Agyrium*. Persoon (1801) submerged *Stictis* in *Peziza*. It appeared again as a distinct genus in Gray's (1821) Natural Arrangement of British Plants, and was treated in an expanded form by Persoon (1822) and Fries (1822).

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1. Based in part on a thesis submitted to the Graduate School of Cornell University for the Doctor of Philosophy degree, January, 1977.

2. Presently Anna E. Jenkins Postdoctoral Fellow.

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Fries (l.c.) assigned *Stictis* to the Helvellacei (Cupulatae) ** Dermeae, along with *Ditiola, Tympanis,* and *Cenangium*, genera not subsequently associated with the Stictidaceae. *Stictis* was there divided into three subgenera: *Stictis* (or *Corticiae*), *Propolis,* and *Xylographa,* based on such macroscopic characters as fruitbody shape and texture.

There is no evidence that Persoon or Fries examined *Stictis* microscopically. Early attempts to resolve the cylindrical asci and filiform spores of *Stictis* must inevitably have met with failure, given the quality of the microscopes available. Schweinitz (1832) attempted to illustrate the hymenium of *S. sphaeroboloidea,* but mistook the brown tips of the paraphyses for conidia and was unable to distinguish the asci. Fries's (1822) statement that the Dermeae are ascigerous is simply an expression of the then-current belief that all hymenomycetes had asci. In the absence of microscopic observations, the connection between *Stictis, Ostropa,* described as a pyrenomycete, and *Schizoxylon,* described as a lichen, was not recognized.

The history of the taxonomy and nomenclature of the Stictidaceae is intimately connected to that of certain groups of lichens. Historically and nomenclatorally, the taxonomy of lichens has an earlier starting point than that of non-lichenized Ascomycetes; many of the conspicuous species were described before 1800. The tradition of separating lichenological and mycological taxonomy antedates recognition of the symbiotic nature of the lichen association. Even when the significance of the term "lichen" was well established, there remained a persistent tendency for mycologists to describe lichens as fungi, overlooking the presence of symbiotic algae.

Once a taxon has been assigned to the wrong group, only luck, or a systematic investigation of dubious names, will extricate it. Despite a growing movement to merge the arrangement of lichenized and non-lichenized fungi, all existing comprehensive keys employ lichenized/non-lichenized as a major dichotomy. Santesson (1952) lists 22 genera and 85 species of foliicolous lichens described as fungi, and indicates that numerous fungi are described as foliicolous lichens. A similar, if numerically less impressive result encountered in the Stictidaceae provides an additional argument for the construction of a system of Ascomycetes which subordinates the presence or absence of a lichen thallus to ascocarp morphology. The importance of lichenological training to mycological taxonomists, and vice versa, cannot be overemphasized.

Fries's (1821-1832) outline classification of microfungi bears little resemblance to that used today. The advent of achromatic lenses and consequent improvement of microscopes in the 1830's permitted mycologists to examine details of hymenial configuration and propose the division (now almost universally accepted) of higher fungi into Ascomycetes, Basidiomycetes, and Fungi Imperfecti.

To the existing criteria of ecological niche, fruitbody shape, size, color, and nature of the spore-bearing apparatus, Corda (1838) added those of spore color and pattern of septation. Both had been used sporadically in earlier works but could not be systematically applied since only large-spored or profusely sporulating species could be investigated. Corda assigned immersed, non-stromatic discomycetes to four genera: *Stictis*, with unicellular, colorless, ovoid spores; *Propolis*, with acicular, colorless, non-septate spores; *Cryptodiscus*, with transversely septate, colorless, ovoid spores; and *Melittosporium*, with brown muriform spores. The habit of classifying small fungi by gross fruit-body characteristics and spore morphology, perpetuated by Saccardo, proved exceedingly persistent. The criteria for assigning species to genera and creating new genera in the Stictidaceae remained virtually unchanged from 1838 to 1932.

The details of Corda's generic delimitations disappeared almost immediately. Fries (1849) listed seven genera of immersed discomycetes and erected the family Stictidaceae to accomodate them. A comparison of the generic concepts of Fries (1822, 1849), Corda (1838) and accepted modern viewpoints (Dennis, 1968; Poelt, 1969) reveals that they have little in common. For reasons discussed in section 9, none is completely tenable nomenclatorally.

TABLE 1

GENERA OF STICTIDACEAE

Fries, 1822	Corda, 1838	Fries, 1849	Modern
Cryptomyces (Stict?)	_____	*Cryptomyces* (Stict.)	*Cryptomyces* (Phacid.)
Stictis subgen. *Propolis* p.p.	*Stictis* p.p.	*Propolis* (Stict.)	*Propolis* (Helot.)
Stictis subgen. *Xylographa*	*Stictis* p.p.	*Xylographa* (Stict.)	*Xylographa* (lichen)
Stictis p.p.	_____	*Schmitzomia* (Helot.)	*Stictis* (Stict.)
_____	_____	*Naevia* (Stict.)	?
Stictis subgen. *Propolis* p.p.	*Propolis*	*Propolis* *b. epiphylla* (Stict.)	*Naemacyclus* (Phacid.)

_____ = not handled

Stict. = Stictidaceae

Helot. = Helotiales

Phacid. = Phacidiales

The modern concept of these genera is little altered from that of Rehm (1887-96), and evolved as follows.

Propolis (Fr.) Fr., although nomenclatorally invalid, was adopted by all subsequent authors except Montagne (1856). Corda's use of the name *Stictis* for immersed species with ovoid unicellular spores is untenable, since it implies exclusion of all of Persoon's original species. *Xylographa* retains its original circumscription, but must be regarded as a genus of lichens.

Fries (1849), ignoring Corda's arrangement of the genera and again delimiting his taxa on macroscopic characters, chose *Stictis pallida* as the type of *Stictis* and proposed the name *Schmitzomia* for *Stictis radiata* and three other species.

Fuckel (1870) characterized *Stictis* as a genus of filiform-spored Ascomycetes. This was also the position taken by Durieu and Léveillé (Bory & Durieu, 1850), although their taxonomic judgements are difficult to assess since no text accompanies the illustrations. Fuckel described *Stictis pallida* (now *Cryptodiscus pallidus*) as having "Schläuche und Sporen wie bei *Stictis radiata,* nur kleiner", and concluded, on this basis, that *S. radiata* should not be excluded from *Stictis.* It is probable that his specimen of *S. pallida* was misidentified. *Schmitzomia* continued for a time to be used for *S. radiata* and its allies (Karsten, 1871; Phillips, 1887), but was gradually replaced by *Stictis.* In the meantime *Schizoxylon* had been removed from the lichens and redescribed (Bory & Durieu, 1850; Tulasne & Tulasne, 1865), and was transferred to the Stictidaceae by Fuckel, who added several additional species to the genus.

Rehm (1887-96) removed *Ostropa* and *Robergea* from the pyrenomycetes and placed them in a separate family, the Ostropaceae, believed to be closely related to the Stictidaceae, a decision approved by von Höhnel (1917c), who also (1911a) suggested that *Vibrissea* and *Apostemidium* were related to *Schizoxylon.*

The period 1850 - 1920 saw the addition of many genera and species to the Stictidaceae. Some are admirably described and unambiguously typified. Most are not. The problems of lost or fragmentary type specimens, species defined on host or geographical range, or described without any clue as to how the differed from other species of the genus, genera based on misapplied specific names, inaccurate published descriptions, or arbitrary criteria, and occult or ill-conceived designation of lectotypes, are familiar to any taxonomist and are discussed under the generic headings to which they apply in section 9.

Following the suggestion of von Höhnel (1911a, 1917c), Nannfeldt (1932) transferred *Vibrissea, Apostemidium, Stictis*, and *Schizoxylon* to the Ostropaceae, rejecting the older family, the Stictidaceae, as one which was highly heterogeneous and unnatural. The species which he examined, a minute fraction of the total, all have cylindrical asci with a prominent apical thickening and long, filiform spores. Nannfeldt recognized a separate order, the Ostropales, for the family, whose ascus morphology paralleled that of the Clavicipitales among the pyrenomycetes.

A division of the Ascomycetes into three major groups, the Plectascales, Ascoloculares, and Ascohymeniales, was proposed. The Plectascales need not concern us here. Briefly, the Ascoloculares (Loculoascomycetes of American authors) were characterized by fruitbodies which develop as naked locules in a stroma and lack true paraphyses. Bitunicate asci and muriform brown spores were cited as correlated characters. In contrast, the Ascohymeniales were characterized by ascocarps derived at least in part from carpocentral elements, and the possession, in most groups, of true paraphyses.

Luttrell's (1951) observations on ascus dehiscence, reemphasizing the fact that key genera of the Loculoascomycetes have functionally bitunicate, jack-in-the-box asci, a character not found in typical non-lichenized Ascohymeniales, underlined the profound distinction between the two groups. Bitunicate asci, being easier to observe than the original developmental distinctions, soon became the major criterion for inclusion in the Loculoascomycetes (Luttrell, 1973).

Careful examination of ascus morphology and arrangment of excipular tissue led Nannfeldt (1932) to follow von Höhnel's lead in removing many former Stictidaceae to the Dermateaceae, where they were included in the Peziculoideae and Naevioideae. Other genera were mentioned, but could not be satisfactorily accomodated in the classification as presented in 1932. Many genera of the former Stictidaceae were ignored entirely.

Few of these have been revived by subsequent authors. Of the genera treated here, fifteen do not appear in The Fungi, volume IV-A (Korf, 1973; Luttrell, 1973) and cannot reasonably be considered synonyms of genera which appear there, are not mentioned by Nannfeldt (1932), and do not seem to have been picked up elsewhere in the post-1932 literature, yet may represent acceptable taxa of non-lichenized fungi.

Two additional post-1932 developments deserve mention. In contrast to the black-and-white distinction between Loculoascomycetes with bitunicate asci and Euascomycetes with unitunicate asci proposed by Nannfeldt and Luttrell, Chadefaud and his colleagues stress morphology and development of asci and ascocarps at a much finer level of resolution and have proposed a system of terminology not obviously compatible with the one favored in this country. Details of their accounts of the Ostropales are discussed in section 3.

Recent attempts to integrate lichenological and mycological taxonomy have earmarked the Ostropales as a group closely related to certain groups of lichens. Vězda (1966) suggests that *Ramonia* (and, by analogy, other genera he proposes to remove from the Gyalectaceae and combine with the Thelotremataceae) may be related to *Stictis*. Hale and Culberson (1970), Poelt (1973) and Henssen and Jahns (1974) all assign the Thelotremataceae to the Ostropales. Gilenstam (1974) considers *Conotrema* to belong to the Ostropaceae.

Unresolved taxonomic problems in the Ostropales include the validity of the order as defined by Nannfeldt, the apparent contradiction between Bellemère's account of development in *Stictis* and the statement that the genus is ascohymenial, the relationship of *Conotrema* and the Thelotremataceae to the non-lichenized Ostropales, the relationship of the Ostropales to other orders of Ascomycetes, and the disposition of unassigned genera and species of the Stictidaceae. These are addressed in the following sections.

III. Materials and Methods

I base my conclusions almost exclusively on field work and on the examination of dried specimens obtained from herbaria. The Stictidaceae, which are subject to alternate wetting and drying in their natural habitat, are unusually amenable to preservation by drying. A properly preserved specimen cannot be distinguished macroscopically or microscopically from one freshly collected in the field.

If a taxonomic judgement is somehow tied to the type of a taxon, the value of the judgement is greatly enhanced. This becomes critical if the taxon is poorly known or if conflicting opinions concerning its nature appear in the literature.

The type of a genus is a species and the type of a species a specimen. For those genera not adequately covered in the literature I have sought to discover the type species and examine its type specimen. When this has proven impossible or impractical, I have relied on authentic material identified by the original author, published exsiccati, and other reliably identified specimens such as material from the herbarium of an author who published a revision of the genus.

For routine examination, individual apothecia were dissected from the specimen in blocks of substrate, rehydrated in 2% aqueous aerosol detergent solution, and sectioned in dilute commercial mucilage at 15μm on a freezing microtome. Intact apothecia of *Stictis* are strikingly hydrophobic and cannot be rehydrated in water in a reasonable length of time. Crush mounts and hand sections were made to isolate individual asci for examination, and also proved useful for rapid identification of some species. Melzer's reagent proved to be the most satisfactory mounting medium; rehydrated sections were mounted and examined immediately. Later, the slides were infiltrated with glycerine and sealed for permanent storage. No changes in dimensions were observed in old slides, but the J+ blue reaction, as well as the dilute amber stain localized in the cytoplasm, faded rapidly in storage. I employed india ink to demonstrate gelatinous sheaths on spores. After failing to demonstrate that rehydrating sections in KOH altered the hymenial iodine reaction in *Stictis radiata* and *Cryptodiscus pallidus*, both species in which the reaction is variable, I abandoned this technique.

Miscroscopic observations were made using an Olympus microscope with ocular micrometer. The illustrations are free-hand renditions of individual specimens, except where noted in the caption.

Measurements given in the text are standardized as follows: Apothecial diameters include the thickness of the margin, and are measured at the surface of the substrate. Obviously immature specimens are exluded. The breadth of the margin is measured to the nearest 5μm at the broadest point, usually at or a little above the tips of the paraphyses. The length of the paraphyses is taken as the depth of the hymenium. In stating the dimensions of asci, I have listed the lengths of asci containing septate spores and the breadth of the ascus at the base of the cap. If a second number appears in parenthesis it is the breadth of the broadest part of a saccate ascus. Spores of filiform-spored species were measured while still in the ascus, since they could not readily be separated from it and their length tends to be quite variable. Breadth of spores was measured at the broadest point, whether apical, median, or submedian. Numbers in parentheses indicate extreme values. Abnormal, unusually large spores are frequently encountered in the Ostropales.

The only species examined in a fresh condition during the course of this study were *Stictis radiata, S. ostropoides, Schizoxylon buriticai,* and *Robergea albicedrae.* Specimens in a desiccated but unprocessed condition were allowed to equilibrate in a moist chamber for 4 - 6 hours before being suspended over a plain agar surface. Moist specimens were allowed to discharge their specimens immediately. Both the number of apothecia and the number of asci discharging spores were low. Cultures obtained from mass ascospore isolates were incubated at 15 and 21° C on potato dextrose agar for one month before being transferred to tubes. No fruiting structures or spores were observed, and the attempt to culture further specimens was abandoned. Cultures identical to those from mass ascospore isolates of *S. radiata* were obtained from portions of excised hymenium from the same collection.

IV. Morphology

A. Vegetative and Imperfect Stages

The vegetative thallus of an Ostropalean fungus consists of intramatrical, narrow (usually less than 2.5 μm), septate, crystalliferous hyphae. In natural collections it is rarely possible to identify elements of the thallus with certainty, except in the immediate vicinity of the ascocarp, since the substrate is normally invaded by other fungi. Abundant production of crystals by the vegetative hyphae of some species, notably *Robergea albicedrae,* gives the substrate a whitish, mealy appearance. This whitening is almost certainly influenced by host pigmentation and other environmental variables, and so is unlikely to be of taxonomic significance. It is useful in locating Ostropales in the field.

Nannfeldt (1932) considered the lack of reported imperfect stages to be a significant characteristic of the order. Tulasne and Tulasne (1865) reported pycnidia containing small, unicellular, colorless spores in a collection of *Schizoxylon sepincola.* Similar pycnidia were reported by Davidson and Lorenz (1938) in *Sch. microsporum*, Bellemère (1967) for *Stictis radiata*, and Gilenstam (1974) for *Conotrema urceolatum*. I have been unable to confirm the association of pycnidia with *S. radiata*. Pycnidia in the other three species are small, erumpent, and more or less spherical, with a wall consisting of a few layers of brown hyphae similar to those of the wall of the perfect stage. This is lined with a compact palisade layer of simple conidiogenous cells. In *Schizoxylon sepincola* these are phialidic. The condiogenous cells of *Sch. microsporum* and *C. urceolatum* are exceedingly small, and I am unable to resolve their structure with a light microscope. Symmetrical conidia suggest that they, too, are phialidic.

Davidson and Lorenz (1938) obtained mycelial cultures from mass pycnidiospore isolates of *Sch. microsporum* and were later able to reinfect the host with these cultures, obtaining pycnidia in artificially induced lesions. This species, then, is at least potentially able to reproduce asexually, which agrees with the authors' statement that the pycnidial stage was more common in nature. The function of pycnidiospores in other Ostropales is unknown.

Distinctive imperfect stages, when known, have proven useful in clarifying the taxonomy of Ascomycetes. Pycnidia such as those described above are found in many groups of Ascomycetes and hence are not a useful character in delimiting the order. Given the difficulty in ascertaining whether a pycnidium is genetically associated with an Ostropalean fungus in nature, any attempt to use conidial stages to delimit species must await production of the conidial stage in culture. Gary Samuels (personal communication) reports pycnidia in a species of *Stictis* in culture, so there is reason to believe that pycnidial characters may one day be incorporated into the classification.

B. The Perfect Stage

General Considerations

Most recent systems of classification divide apothecial Ascomycetes into two groups - Ascohymeniales or Euascomycetes, and Ascoloculares or Loculoascomycetes. The former are characterized by true paraphyses and marginal tissues derived at least in part from carpocentral elements, the latter by pseudoparaphyses (or no paraphyses at all) and marginal tissues derived from stromatic elements. Controversy surrounds the placement of groups with a stromatic margin and true paraphyses, but, in general, those forms (for example, the Coronophorales) with unitunicate asci are considered ascohymenial even if the marginal tissues are stromatic in origin.

Before discussing the anomalous nature of the Ostropalean ascocarp, it would be useful to review the structure of a typical apothecium.

In *Cyathicula coronata* (Bull.) de Not. (Figure 1a), as in most members of the Leotiaceae, the apothecia are complex, highly-developed fruitbodies characterized by a parathecium

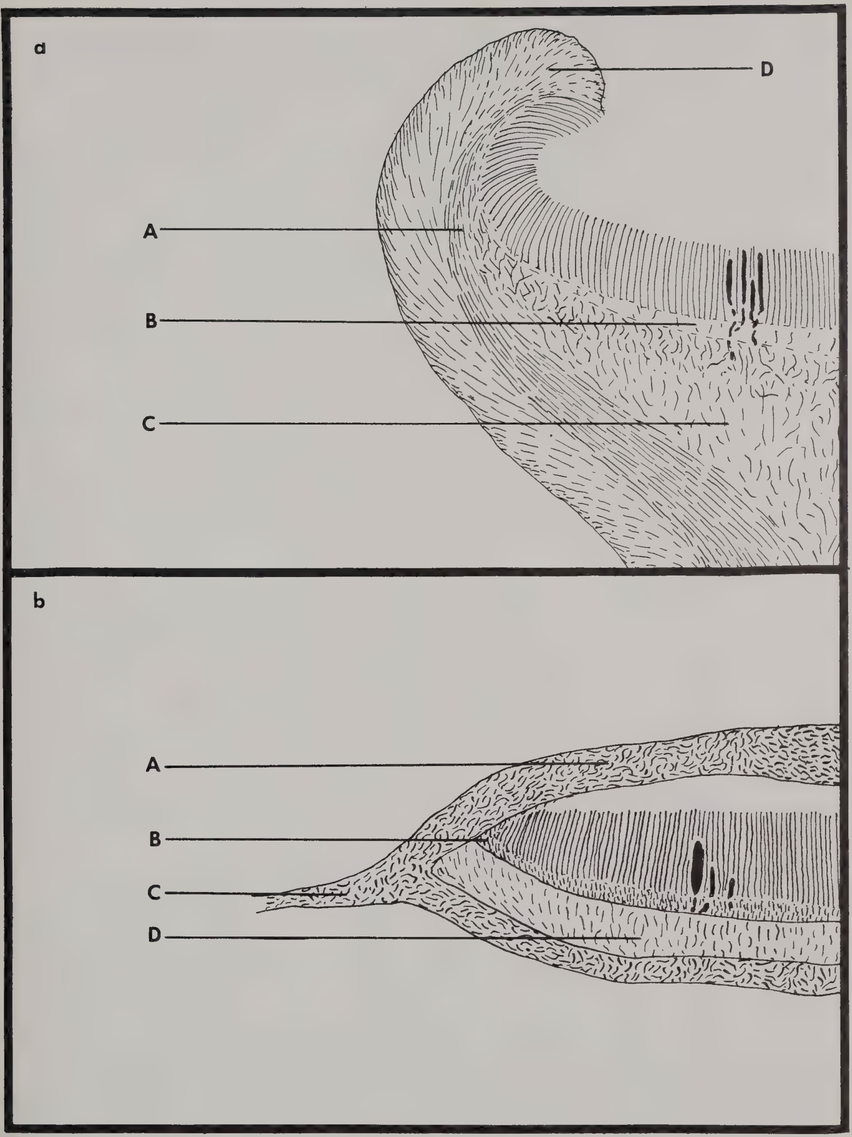

FIGURE 1. a. *Cyathicula coronata*. A = Parathecium. B = Subhymenium. C = Medulla. D = Amphithecium. b. *Rhytisma acerinum*. A = Roof of conceptacle. B = Annular margin. C = Stroma. D = Internal region of conceptacle. Adapted from Bellemère (1967).

(A), a zone of hyphae which arises from the parathecial muff surrounding the carpocenter and gives rise to the amphithecium

(D). A zone of differentially staining cells beneath the hymenium is termed the subhymenium (B); tissues, usually loosely organized, beneath the subhymenium are termed the medulla (C). Figures and terminology are adapted from Bellemère (1967). In Korf's (1973) terminology, the term ectal excipulum is used for parathecium + amphithecium, and medullary excipulum for medulla.

The discostromatic apothecium, exemplified by the ascocarp of *Rhytisma acerinum* (Pers.) Fr. (Figure 1b), is characterized by having an annular margin (also termed a pericentral plexus by Letrouit-Galinou [1968]) surrounding the carpocenter. At the margin of a discostromatic ascocarp there is a region containing both basally-attached and apically-attached filaments. The ascocarp expands by lateral expansion of the plexus, which I have consequently termed meristematic. The inner face of the plexus is a zone of differentiation of the paraphysogenous apparatus. Bellemère designates A and D by the neutral terms "toit du conceptacle" and "partie interne du conceptacle" respectively. Powell (1974), following the interpretation of Nannfeldt (1932) and others of a Rhytismataceous fruitbody, calls (A) stroma and (D) apothecium, implying that the former is vegetative in origin.

Numerous variations on these two basic apothecial types were documented by Bellemère (1967). The descriptive terms are independent of the Loculoascomycete-Euascomycete dichotomy. Bitunicate asci occur in apothecia of both types.

Chadefaud (1973) recognized three principal types of asci among Ascomycetes which actively discharge their spores: nassaceous (functionally bitunicate, with a nasse apicale or system of rods surrounding the apical pore of the endoascus), annelascaceous (functionally unitunicate, with a distinct amyloid or inamyloid apical ring) and archaeascaceous (apparently bitunicate, with rostrate or bilabiate dehiscence). Operculate asci were viewed as a modification of the annelascaceous ascus.

The interrelationship of apothecial morphology and ascus dehiscence in defining orders of discomycetes is summarized in table 2. Orders are entered as circumscribed by Luttrell (1973:L), Korf (1973:K), and Poelt (1973:P). Groups containing non-discomycetous (in the broad sense) elements are indicated by p.p.

Modern mycologists have, in general, considered paraphyses and other sterile interascal filaments to be less significant than asci and marginal tissues in delimiting orders. In addition to compressed stromatic remnants found in many Loculoascomycetes, mycologists recognize two classes of sterile threads: paraphyses, which grow upward from the base of the centrum and have free ends, and pseudoparaphyses, which grow downward from the roof of the centrum and are ultimately attatched both apically and basally. In some lichens and Sarcosomateae the interascal filaments branch and anastomose to form a complex network. Apical filaments arising from a true perithecial wall occur in the Hypocreales. Sterile interascal threads are completely absent in some groups. Mycologists have widely assumed that pseudoparaphyses occur only in the Loculoascomycetes, and

TABLE 2

ORDERS OF DISCOMYCETES

ASCUS DEHISCENCE AND APOTHECIAL MORPHOLOGY

	Nassaceous	Annelascaceous	Archaeascaceous
Lenticular Disco-stromatic	Hysteriales (L) Microthryiales pp (L) Arthoniales (P) Graphidales (P) (Melaspileaceae)	Phacidiales (K) Graphidales (P)	
Parathecial	Hysteriales (Pat-tellariaceae) (L)	Helotiales (K) Pezizales (K) Ostropales *(Vibrissea)* (K)	Lecanorales (P)
Other	Myriangiales (L) Microthyriales pp (L) Dothideales pp (L)	Ostropales (K) Medeolariales (K)	Lecanorales (P)

and that true paraphyses are never associated with bitunicate asci. Both hypotheses deserve further investigation. According to Bellemère (1967), paraphysoids (= pseudoparaphyses) occur in *Therrya fuckelii* and *Propolis faginea;* Janex-Favre (1964) and Letrouit-Galinou (1968) report both paraphysoids and paraphyses in species of *Graphis.* None of these genera has bitunicate asci. Poelt (1973) includes both genera with true paraphyses and genera with netlike anastomosing paraphyses in the Lecanorales.

The use of ascospore characters to delimit taxa above the rank of genus has fallen into disrepute in recent years. Nonetheless, one cannot help but be impressed by the near-constant association between certain ascospore characteristics and such unquestioned criteria as ascus dehiscence and fruitbody morphology. The characters discussed below seem to segregate along family lines.

The Pezizales, Tuberales, Medeolariales, and Cyttariales, as well as most Basidiomycetes, are characterized, without exception, by unicellular spores. The remaining orders of discomycetes are characterized by unicellular or septate spores. From this I conclude that the loss of septa in an originally septate spore is a matter of common occurrence, but that septa do not normally arise *de novo* in a group which does not already have septate ascospores.

The occurrence of muriform spores in the Helotiales and Phacidiales is questionable. Customarily, mycologists consider muriform spores as characteristic of the Loculoascomycetes. They also occur in the Lecanorales, Graphidales, Thelotremataceae, and Ostropaceae. It would appear, empirically, that the ability or lack thereof to form longitudinal septa in an ascospore has significance at the ordinal level, although it is not immediately obvious why this should be the case.

Color and ornamentation serve to define several distinct families (e.g. Ascobolaceae, Buelliaceae), but have little

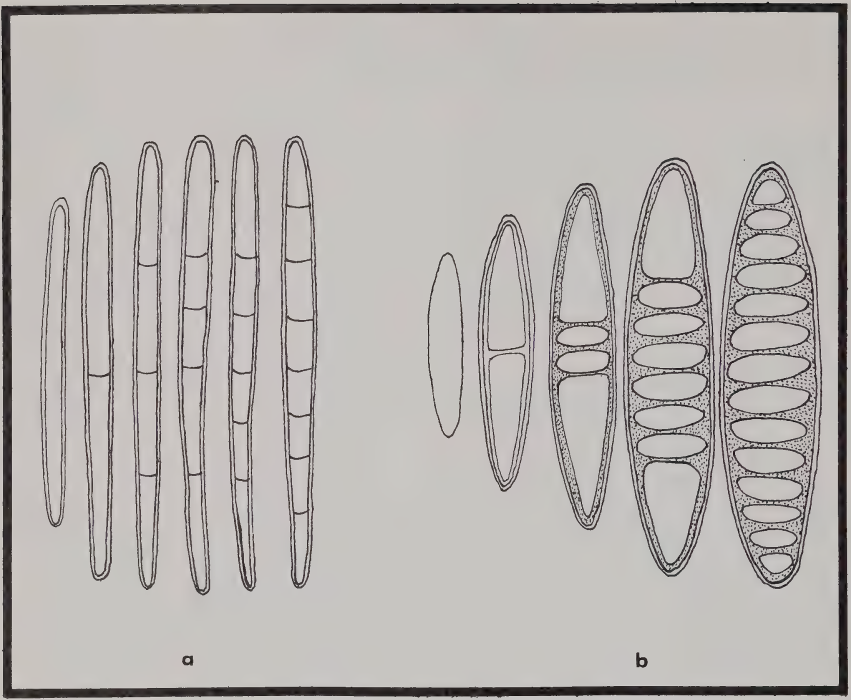

FIGURE 2. a. Normal sequence of ascospore septation in *Stictis friabilis*. b. Graphidean ascospore septation in *Ocellularia* sp. (Diagrammatic).

significance at the ordinal level. Loculoascomycetes tend to be brown-spored, inoperculate discomycetes hyaline-spored.

The normal number of ascospores per ascus is 8. Deviations from this number occur in most groups, and are considered, at most, of generic significance. Polysporous asci may arise in one of three ways: by initial formation of more than 8 spores, by budding of primary ascospores within the ascus, or by disarticulation of initially septate spores. The ontogenetic history of polysporous asci may be of considerable taxonomic significance. Initially polysporous asci are characteristic of the Pezizales, disarticulating spores of the Hypocreales.

Asci with fewer than 8 spores arise either by the initial delimitation of fewer than 8 spores or by abortion. Abortion of ascospores to leave asci with a variable number of spores is characteristic of the Graphidales and Thelotremataceae.

A striking feature, and one which has been little emphasized in the classification of Ascomycetes, is the sequence of spore septation. Unless the mature ascospore has cells of unequal sizes, the first septum in a maturing ascospore is normally median. Subsequent septa may be laid down in one of two ways. In most inoperculate discomycetes septation proceeds as in *Stictis friabilis* (Figure 2a); each successive septum divides an existing cell into approximately equal pieces. Many lichens, on the other hand, have spores such as those of *Ocellularia* (Figure 2b), in which septation proceeds distally toward the poles and immature spores have cells of markedly unequal sizes. Spores of this second type have unequally thickened walls and a lens-shaped lumen; the wall is obviously laminate when viewed with a light microscope and in most instances the inner wall stains red or purple at some stage in development. The peculiar morphology, development, and histochemistry of this spore have long been known (Nannfeldt, 1932; Janex-Favre, 1964; Henssen & Jahns, 1974), but no systematic attempt has been made to erect taxa above the rank of family using it as a primary character. Spores of this type occur in genera with unitunicate and bitunicate asci, and in both pyrenomycetes and discomycetes. Endascosporic cells have been demonstrated in a few taxa (Morgan-Jones, 1973).

The conidia of some species of *Helminthosporium* have an apparently similar structure and also become septate in an unusual manner. The first septum is eccentric and close to the point of attatchment to the conidiophore; septation proceeds toward the apex. Luttrell (1963), who investigated the phenomenon, termed the sequence of septation acrosporous and the spore distoseptate. The spores of *Helminthosporium* do not turn red in iodine solutions and the perfect stage *(Cochliobolus)* has thin-walled, normally septate spores.

To apply Luttrell's terms to the ascospores of lichens would imply some sort of phylogenetic relationship between the two structures. I prefer to use a separate term, GRAPHIDEAN (from *Graphis*, a genus with this type of spore) for the lichen ascospore.

For purposes of the discussion which follows, stroma is defined as a layer of dark-colored, morphologically differentiated vegetative cells. This is the morphological, rather than the ontogenetic, definition. An apothecium may be discostromatic in Bellemère's, or ascolocular in Nannfeldt's system, and yet lack a stroma as defined here.

Marginal Tissues of Ostropales

The complexity and small size of Ostropalean marginal tissues have prevented their being used to delimit taxa in the group. With the current emphasis on marginal tissues as a taxonomic criterion in other families of discomycetes it becomes necessary to examine the Ostropalean margin in greater detail.

Before discussing recent attempts to characterize Ostropalean marginal tissues, some mention should be made of their use in older classifications. Marginal color, an easily observable character, was often used for delimiting species and was the basis for segregating *Cyclostoma* from *Stictis*.

Fries (1849) considered a hymenium which separated from the margin when dry to be significant and used this character to separate *Schmitzomia* from *Stictis*. Nannfeldt

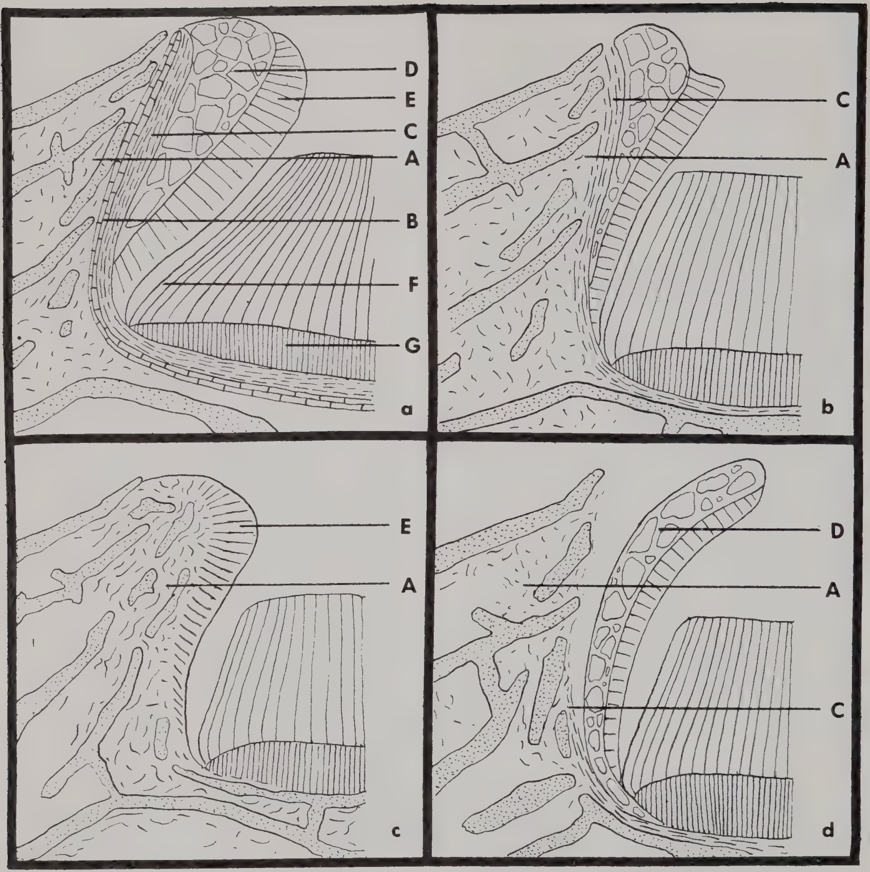

FIGURE 3. a. *Stictis bicolor*, cross section of apothecium. b. *S. radiata*. c. *S. graminicola*. d. *S. sphaeroboloidea*. (Diagrammatic). A = Thalline margin. B = Stroma. C = Wall. D = Crystalline layer. E = Periphysoids. F = Hymenium. G = Subhymenium.

(1932) distinguished between the hyphal excipular structure of *Stictis* and *Schizoxylon* and the pseudoparenchymatous structure of *Vibrissea*. Christiansen (1954) used the presence of periphysis-like hyphae in the margin to separate *Stictis* and *Schizoxylon*.

I have chosen to regard the complex, multilayered margin of species such as *Stictis bicolor* (Figure 3a) as a representative type from which the others can be derived by reduction. The small, deeply urceolate fruitbodies are immersed in wood which has become permeated with the vegetative hyphae of the fungus. In the neighborhood of the apothecium disintegrating wood and hyphae may become compacted to form a spurious THALLINE MARGIN.

In some species of *Stictis* there is a well-defined STROMA surrounding the apothecium; it may or may not enclose host tissue.

The WALL of the ascocarp is a compact layer of thin-walled, colorless or brown, non-carbonized hyphae lying between the stroma and the CRYSTALLINE LAYER.

The inner face of the margin of *Stictis* is lined with a layer of simple to branched filaments oriented more or less perpendicularly to the wall. By analogy with similar structures in lichens, these are termed PERIPHYSOIDS. Between the periphysoids and the wall there is a prominent layer of crystalline material. In the literature this is presumed to be calcium oxalate (cfr. Christiansen, 1954), but I can find no evidence that this has been investigated chemically. Variability in the color reaction produced with KOH in species of *Schizoxylon* suggests that other substances may be present.

The stroma and wall may be complete, or the SUBHYMENIUM, a cushion-shaped pad of small, angular, thin-walled cells, may rest directly on the substrate. When dry, the HYMENIUM separates from the margin.

Numerous, well-developed, persistent paraphyses are characteristic of all Ostropalean fungi. In most species all of the paraphyses are identical, but in a few the outermost ring of paraphyses is agglutinated and differentially pigmented. These are termed MARGINAL PARAPHYSES.

The terminology I have given is a synthesis of several attempts to describe the structure of *Stictis* or closely related genera. Davidson and Lorenz (1938) provided a detailed drawing of *Schizoxylon microsporum*, but referred to the margin simply as a "black upper covering layer". Christiansen (1954) illustrated the margin of *Stictis radiata* and compared it with the margin of his new genus *Nanostictis*. In a monograph of *Conotrema*, Gilenstam (1974) employed a terminology which I have adopted with some modifications. None of the species of *Conotrema* has a prominent crystalline layer, and the terms he used for stroma and wall are cumbersome, albeit descriptive.

The term thalline margin, as used by Gilenstam, means lichen thallus. Lichenologists include under the term thalline margin any marginal tissue containing algae. Gilenstam's account of its origin in *Conotrema* suggests that it is a pre-existing vegetative structure. I consider it homologous to the disintegrating host tissue invaded by vegetative hyphae which constitutes the thalline margin in *Stictis*. Letrouit-Galinou (1968) has shown that the thalline margin of *Lecanora subfuscata* is an outgrowth of the parathecium and hence analogous to the proper margin of *Bacidia* and other Lecanorales rather than to the thalline margin of *Conotrema*.

Table 3 summarizes the terms employed by various authors.

The apothecia of *Stictis, Ostropa, Robergea, Acarosporina, Conotrema,* and *Propoliopsis* all conform to the general pattern outlined above. Reduction in, or loss of, one or more of the marginal layers accounts for much of the

TABLE 3

TERMINOLOGY OF ASCOCARP TISSUES

Christiansen (1954)	Bellemère (1967)	Gilenstam (1974)	Sherwood
Host tissue	_____	Thalline margin	Thalline margin
_____	_____	Scleroplechtenchymatous wall	Stroma
Hyphae covering outside of excipulum	Fourreau formé par le couche moyenne du conceptacle	Paraplechtenchymatous wall	Wall
Crystals	Toit du conceptacle	_____	Crystalline layer
Periphysis-like hyphae	Filaments descendents	Periphysoids	Periphysoids
Paraphysogenous complex	Plancher du conceptacle	Hypothecium	Subhymenium
_____	_____	Marginal paraphyses	Marginal paraphyses

A blank (_____) indicates that the structure was not present in the species investigated.

intergeneric variation and some of the intrageneric variation in the group. A few general trends are discussed below.

The thalline margin is frequently indistinguishable, but in some cases layers of compressed wood or crystalliferous or gelatinous hyphae are present and conspicuous. The thalline margin is not included in measurements of the margin proper. The stroma varies in thickness and degree of development, and is included in measurements of the margin; it may be complete, incomplete, or absent as in *Stictis radiata* (Figure 3b) and its allies.

Features of the wall used in delimiting species include its thickness, the color, size, and shape of the cells, and whether or not gel is present. It is normally composed of tightly packed textura intricata, or more loosely packed hyphae distributed in a gelatinous matrix, but may approach a pseudoparenchymatous texture. In some species, for example *Stictis graminicola* (Figure 3c), both wall and crystalline layers are absent, and the periphysoids are borne directly on a thalline margin.

The dimensions of the crystalline layer tend to vary within a single collection, increasing with age. Some species have a consistently narrow margin, and others lack an organized crystalline layer altogether. The crystals are colorless in transmitted light but may appear yellow or brown in mass. Most species produce crystals of variable size, but some produce only small (under 10µm) crystals. Usually the crystals are irregular in shape, but sometimes they are narrowly rhomboidal and form rosettes. In addition to the crystalline layer, there may be crystals scattered in

ERRATA

Page 17, line 3: *for:* A = Crystalline layer.
read: D = Crystalline layer.

Page 60, line 27: *for:* a basal gelatinous appendage,
read: an apical gelatinous appendage,

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er

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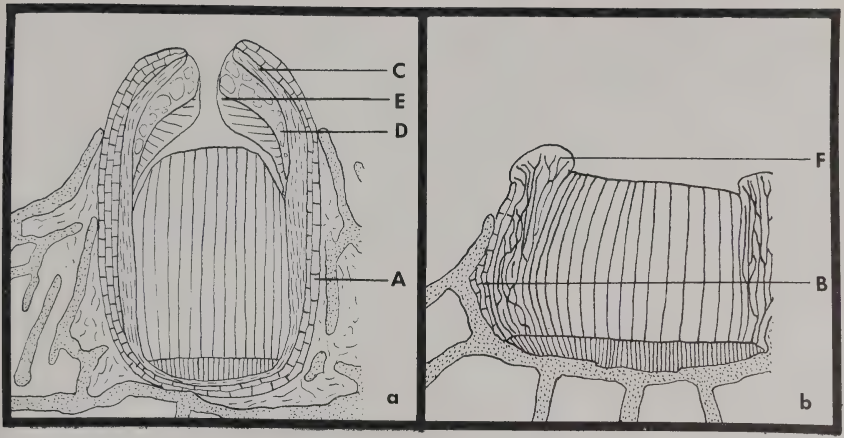

FIGURE 4. a. *Ostropa cinerea.* Cross section of apothecium. b. *Schizoxylon berkeleyanum.* (Diagrammatic). A = Thalline margin. B = Stroma. C = Wall. A = Crystalline layer. E = Periphysoids. F = Margin of *Schizoxylon.*

the wall or deposited externally. Occasionally the subhymenium or paraphysis tips are crystalliferous. *Stictis* sect. *Lichenopsis* (Figure 3d) is distinguished by having a crystalliferous wall which separates from the substrate.

Periphysoids are present in all species of *Stictis,* and are the most important diagnostic character for the genus. Within fairly broad limits, their length, color, branching pattern, and the presence or absence of gel are useful species characters. In *Ostropa* (Figure 4a) periphysoids occur only above the level of the hymenium, which consequently does not separate from the margin when dry. *Robergea* is similar, but has greatly elongated ascocarps.

Ramonia, Gloeolecta, and *Odontotrema* differ from the preceding genera in lacking both a stroma and crystalline inclusions in the margin. In addition, the periphysoidal layer is highly modified, consisting, not of distinct filaments, but of a compact, fleshy, pseudoparenchymatous matrix in which the cells are oriented perpendicularly to the surface of the ascocarp. In dry specimens the margin separates from the hymenium, but this is difficult to determine when the margin is inrolled and covers the disc.

The apothecial stucture of *Schizoxylon* (Figure 4b) is quite distinct from that of *Stictis.* According to Bellemère (1967) the fruitbody develops initially within a pre-existing matrix of vegetative hyphae which may be visible on the flanks of the mature apothecium. In cross section the hymenium is not sharply delimited from the margin by a parathecium or circular fissure, and there are no periphysoids. In species which have apically branched, brown paraphyses, the hyphae of the margin are also apically branched and brown. Marginal hyphae appear to anastomose frequently. I interpret the margin as being paraphysoidal in origin. The marginal hyphae are reminiscent of the branched and netlike interwoven paraphyses found in some lichens. Crystals are commonly present, but do not form a compact layer.

The Hymenium

Chadefaud (1973) describes the Ostropalean ascus as being cylindrical, with thin lateral walls and a massive apical cap pierced by a narrow pore. Even when only indubitable members of the genera traditionally assigned to the order - *Stictis, Schizoxylon, Ostropa,* and *Robergea* - are considered, the picture of ascus morphology is far from clear or uniform.

The typical Ostropalean ascus, as exemplified by *Stictis radiata,* is initially uniformly thin-walled. At a somewhat later stage in development it appears very thick-walled, with a narrow cell lumen and distinct, but undifferentiated apical thickening. As the spores are delimited, the lateral walls again appear thin, while the apical cap assumes its final characteristic appearance, which Chadefaud interprets as an apical ring. The structure is no more refractive than the remainder of the inner wall and does not stain differentially in iodine or cotton blue. It persists in discharged asci.

The ascus cap is prominent in truly filiform-spored species, but scarcely distinguishable in species with shorter, broader spores. Mature asci are cylindrical only if the diameter of the fascicle of spores does not exceed the diameter of the ascus at the base of the cap. The asci of all species of *Stictis, Ostropa,* and *Robergea* that I have examined are functionally unitunicate.

The asci of *Schizoxylon berkeleyanum* resemble those of a typical *Stictis.* Those of other species, notably *Schizoxylon occidentale* and its allies, lack all trace of an apical cap and tend to remain uniformly thick-walled. I have searched many specimens of *Schizoxylon* without finding discharged asci and am uncertain whether the asci are functionally unitunicate. The same is true of *Propoliopsis arengae.*

Operculate asci, asci with prominent amyloid or refractive rings, uniformly thin-walled asci with a distinctly pointed apex, and typical, non-cylindrical, functionally bitunicate asci do not occur in the Ostropales.

All Stictidaceous fungi which I have investigated have paraphyses (some, for example *Schizoxylon,* may also have pseudoparaphyses). These probably serve a protective function in species with a massive epithecium and long-lived fruiting bodies. The most common apical configuration is exemplified by the paraphyses of *Stictis radiata,* which are colorless, slightly swollen at the tip, and occasionally branch. Paraphyses which branch repeatedly near the apex, but are neither swollen nor pigmented, are here termed PROPOLOID (from *Propolis,* a genus characterized by this type of paraphysis). The paraphyses of *Schizoxylon* are characteristically branched, apically swollen, and brown at the tip.

Frequently the gel in which the paraphyses are cemented turns blue in iodine solutions, particularly near the apices. The older literature implies that the ascus membrane is J+, but this is true only of *Acarosporina*.

Ascospore morphology is extremely diverse even among indubitable members of the order. The typical spore is long-cylindrical or filiform, colorless, thin-walled, and transversely multiseptate. It may have an obvious gelatinous sheath, coil when mounted in KOH, or disarticulate at the septa to form simple or septate part-spores.

Muriform spores occur occasionally in the order. In addition to the examples previously reported (Sherwood, 1976a) they occur as sporadic abnormalities in a number of species.

Brown spores are of doubtful occurrence. I have been unable to confirm their presence in *Stictophacidium*, a genus whose affinities are by no means certainly Ostropalean. Unicellular spores (as opposed to part-spores) occur only in *Stictophacidium*, *Ramonia*, and *Thelopsis*. Wall ornamentation at the level of resolution of the light microscope is unknown.

V. DEVELOPMENT

Available information about development in the Ostropales indicates that the general pattern is initial differentiation of a vegetative (or stromatic, in the developmental sense) mass, usually immersed in the substrate or lichen thallus. This is followed by appearance of ascogonia, elaboration of ascogenous hyphae and true paraphyses, further differentiation of vegetative accessory structures, and rupture of the overlying substrate to expose the hymenium.

According to Gilenstam (1974), the ascocarp of *Conotrema urceolatum* develops from a primordium whose outer layer is composed of dark, interwoven hyphae and whose inner part consists of inward-pointing, colorless hyphae. The outer layer expands basally and the hyphae in the interior of the primordium elongate. Ascogonia appear only after the primordium has undergone considerable differentiation. Paraphyses are presumed to arise from the supporting cells of the ascogonia, since bundles of paraphyses, separated by sterile vegetative hyphae, were found in ascocarps with multiple ascogonia.

Bellemère (1967) has a somewhat different interpretation of ascocarp development in *Stictis radiata*. The earliest stage which he illustrates is one in which paraphyses are already present within a 3-layered conceptacle. The innermost layer gives rise to periphysoids after paraphyses have been produced; the outermost layer disappears, and the middle layer becomes the wall. I disagree with this interpretation of ascocarp structure, which implies that the crystalline layer is derived from an internal layer present at a very early stage in development, and that the hyphae of the crystalline layer are continuous with the hyphae at the base of the ascocarp.

I interpret the development of *Stictis radiata* as follows. The intial stage (Figure 5a, adapted from Gilenstam [1974]) consists of an aggregation of hyphae and disinte-

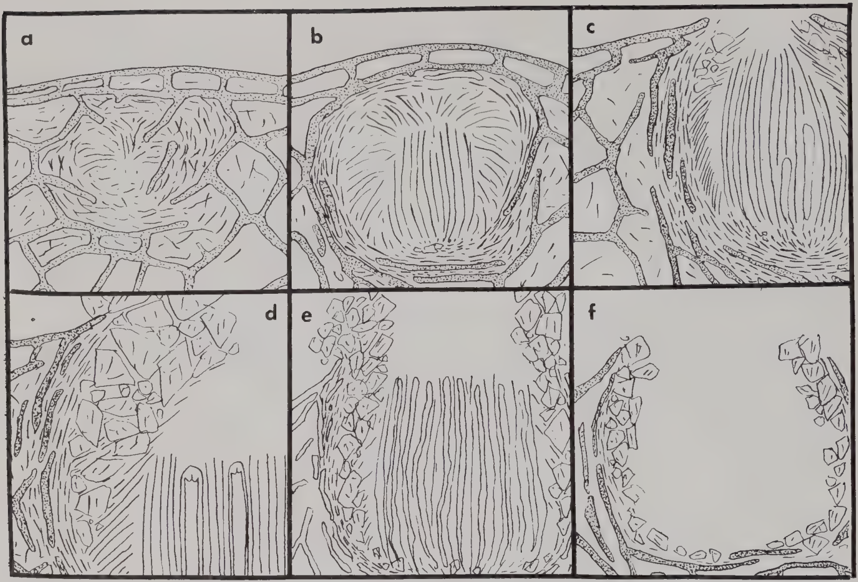

FIGURE 5. Development in *Stictis* sp. a.The apothecial primordium. b. Elongating paraphyses pushing the ascocarp deep into the substrate. c. Young apothecium. d. Periphysoids producing the crystalline layer. e. Old apothecium. f. Empty crystalline cup. (Diagrammatic).

grating host tissue, with a core of inward-projecting hyphae. I have been unable to observe this stage in this species, whose ascocarps originate beneath the surface of the substrate, and so am uncertain whether ascogonia are produced. As the ascocarp enlarges by continued growth of the inward-pointing periphysoidal hyphae and elongation of the paraphyses, the surrounding substrate becomes compacted to form a thalline margin. Paraphyses which elongate before the surface of the host ruptures push the apothecium deep into the substrate (5b). The fruitbody opens by a pore (5c) at about the same time asci are produced.

The crystalline layer is produced by the periphysoids (5,d,e). As these elongate, their bases become crystalliferous. Eventually the periphysoids disintegrate, leaving an almost entirely crystalline margin in old apothecia (5e). Eventually the hymenium falls out, leaving an empty hole in the wood (5f).

The developmental sequence presented here accounts for several observations not explained by Bellemère's account. Usually the apical portion of the margin is more highly developed than the basal portion; in a few species the subhymenium and paraphyses appear quite unconnected with the margin. This suggests that the paraphyses elongate rapidly after the margin has differentiated, pushing the apothecium proper, which consists only of subhymenium, asci, and paraphyses, deeper into the substrate, leaving the remains of the marginal tissues as a collar around the opening. As the ascocarps of *Stictis* grow, the crystalline layer becomes increasingly prominent, while the periphysoids tend to disappear. In most species there is no distinct layer of hyphae between the periphysoids and the wall at any stage in development. In some cases the wall, or loosely consolidated hyphae transitional between the wall and the periphysoids, may be crystalliferous.

In most species of *Schizoxylon* the fruitbody becomes erumpent at a somewhat earlier stage of development than does *Stictis*, and the stromatic origin of the margin is more evident. Observations on *Schizoxylon sepincola* have led me to suspect that this species possesses both true paraphyses and pseudoparaphyses. Immature stromata have a nucleus of vertically-oriented hyphae which do not seem to be associated with fertilization phenomena. In species such as *Sch. juniperinum*, which lack a prominent stromatic margin, the outermost paraphyses branch and anastomose. I suspect that the structure which Bellemère (1967) terms a parathecioid muff (manchon parathécioïde) in *Ostropa* is actually remnants of pseudoparaphyses. Ascocarps containing both paraphyses and pseudoparaphyses have been reported elsewhere in the literature (Bellemère, 1967; Letrouit-Galinou, 1968).

In a review of ascocarp development in a number of lichen genera, Henssen (1976) has proposed that development in the Verrucariaceae, Porinaceae, Gyalectaceae, and Thelotremataceae follows a common pattern which is quite different from that of the majority of lichenized discomycetes and tends to produce modified fruitbodies. In this developmental type, the primordium of the ascocarp consists of an outer cortical layer and an inner cavity filled with inward-projecting hyphae which grow from all sides. Those at the apex of the cavity become periphysoids in discomycetes and periphyses in pyrenomycetes. In the Gyalectaceae the periphysoidal hyphae elongate and are indistinguishable in mature fruitbodies.

This is precisely the type of development which Gilenstam (1974) found in *Conotrema*. The immersed saprophytic Ostropales appear to differ only in the inclusion of host tissue in the outer layers of the developing primordium.

The exact taxonomic significance of this developmental type is unclear. Certainly the Verrucariaceae, with thin-walled, J- spores and bitunicate asci, have never been associated with the Thelotremataceae in lichenological classifications.

VI. Ecology and Distribution

The Ostropales are predominantly saprophytic on long-dead, weathered plant debris in warm climates. *Biostictis*, *Acarosporina*, and *Robergea albicedrae* are capable of attacking living plants.

Although specific evidence is lacking, indirect evidence supports the contention that the fruitbodies of *Stictis* and *Schizoxylon* are long-lived. *Stictis radiata* may be collected throughout the rainy season from September until April on the west coast of North America. Except at the very end of the rainy season, most of the apothecia in any collection will be fertile and contain both mature asci and asci in early stages of development. The fruitbodies persist in the summer as effete crystalline cups. In collections from high latitudes and dry alpine areas, where the decay rate of wood is slow, collections which contain mature fruitbodies often contain effete, weathered fructifications which have lost all trace of hymenium, probably remnants of last year's fruiting. I interpret these observations to mean that individual fruitbodies persist for several months in a cool climate.

Ascospores of *Stictis*, *Schizoxylon*, and *Robergea* germinate immediately by multiple germ tubes following discharge onto agar. Nothing in their structure suggests that they serve as resting structures in nature. Presumably it is the persistent vegetative mycelium which permits survival under unfavorable environmental conditions.

The majority of Ostropalean fungi are filiform-spored. *Robergea cubicularis*, an extreme example, has spores 2 mm long and 2 µm broad. Spores of some species coil when released from the ascus. The general picture is that of an aquatic spore (terminology follows Gregory [1952]), but there is no evidence that any of these fungi occupy an aquatic habitat. The production of a filiform impaction spore may be an adaptation for colonizing small-diameter standing dead plant parts. This may explain why species with disarticulating spores are less common than species whose spores are discharged as a unit. The part spores of *Schizoxylon* are penetration spores poorly adapted for colonizing small twigs. Filiform spores also have a large surface to volume ratio, which increases their buoyancy.

Calcium oxalate is produced by many fungi as a by-product of metabolism. Its presence in the margin of Ostropales may simply be a reflection of the need for an immersed fungus to dispose of its waste products.

Fruitbodies of *Robergea albicedrae* which were stored in an air-dry condition for two weeks revived and discharged their spores normally when rehydrated in our laboratory. Like many Ostropalean fungi, this species occurs on bark and twigs in a rather dry climate, where the fruitbodies would presumably be desiccated for weeks at a time. In general, the Stictidaceae seem well able to live in habitats too dry for many fungi. They are also abundant in tropical cloud forests and foggy maritime areas. Areas which are favorable for lichens tend to be favorable for Stictidaceae. Perhaps, like lichens, they are sensitive to alternate wetting and drying. Their slow growth rate, as demonstrated in culture, would make them poor competitors under conditions favorable for other fungi.

The host specificity of frequently-collected species varies greatly. *Robergea albicedrae*, as far as is known, occurs only on *Juniperus*, and *Stictis ostropoides* may be specific to *Lonicera involucrata*. Most species occur on several unrelated hosts, having, at most, some preference for texture. *S. radiata*, an extreme example, occurs on stems and wood of pteridophytes, gymnosperms, monocots, and dicots, and also on rope, conifer needles, and old leather. *S. pustulata* occurs on a wide variety of herbaceous material, but never on hard wood. Some species of plants are good hosts for Ostropales. It is unclear why this should be the case; good hosts are not necessarily taxonomically related.

Extreme caution should be exercized in using host as a criterion for identifying a fungus in this group. Nearly all substrates which will support any member of the group will also support *S. radiata*, and the host range of infrequently collected species is probably badly distorted.

As far as is known, *Biostictis* and *Lillicoa* are restricted to tropical America. *Ostropa, Ramonia, Conotrema* and *Robergea* occur in North America, Europe, Africa, and Asia. Individual species tend to exhibit wide geographical ranges, although some of these distribution patterns may be spurious and based on too broad a species concept. *Stictis radiata, S. stellata*, and *S. carnea* are worldwide in their distribution. *Schizoxylon berkeleyanum* occurs in Europe, North Africa, North America, and the Middle East. *St. polycocca*, a common European species, also occurs in British Columbia, and Gilenstam (1974) reports *S. schizoxyloides*, a distinctive North American species, from Sweden. I am still uncertain whether the only two collections I have seen of *S. pusilla*, one from Tierra del Fuego and one from Great Britain, really represent the same species. They are certainly indistinguishable morphologically. Among species with more restricted distributions are *S. sphaeroboloidea* (eastern North America), and *S. serpentaria* and *S. chrysopsis* (western North America). Clearly, extensive collecting is needed before a true picture of the distribution on non-European species will emerge.

VII. The Relationships of the Ostropales to other Groups of Ascomycetes

The Ostropales, is general, represent a taxonomically isolated group, and one whose potential relatives are poorly known. Rather than propose a phylogenetic scheme of classification, I prefer to comment on those groups of fungi which have in the past been considered related to the Ostropales, examining the characters they share with the order.

Many orders of Ascomycetes are clearly not closely related to the Stictidaceae. Recent systems of classification suggest the Clavicipitaceae and Thelotremataceae as potential relatives. For the sake of completeness, those families which now include the excluded genera of the Stictidaceae - the Dermateaceae, Phacidiaceae, Patellariaceae, and Hysteriaceae - should be investigated, if only because the current delimitation of these families includes morphological features once thought diagnostic for the Stictidaceae. Finally, some comments should be made concerning the Gyalectaceae, which are often associated with the Thelotremataceae in systems of lichenological classification.

Clavicipitaceae

The Clavicipitaceae comprise a group of pyrenomycetes with long cylindrical capitate asci and filiform ascospores. The similarity to Ostropalean asci is striking and has led several authors to suggest that the two groups are related. Gäumann (1964) and Kreisel (1969) included the Ostropaceae in the Clavicipitales, without, however, providing a detailed explanation of their reasons for doing so. Neither Nannfeldt (1932) nor Dennis (1968) indicates the level (if any) at which the two groups should be considered related.

Filiform ascospores are found in many families of Ascomycetes. Where they are found, they tend to be associated with cylindrical asci with a thickened apex. *Acrospermum* and *Vibrissea* are examples of two apparently unrelated genera whose asci resemble those of *Stictis*. Likewise, the asci of *Leptospora* (Pleosporaceae), although bitunicate, appear Ostropalean.

The Clavicipitaceae have fruitbodies, usually interpreted as perithecia (Doguet, 1960; Rogerson, 1970) but occasionally considered to be ascolocular (Nannfeldt, 1932), which are either superficial or imbedded in a true stroma. Ecologically they are specialized parasites of insects, grasses, and other fungi. Fruitbodies lack paraphyses, except at a very early stage in development. The hymenial gel does not turn blue in iodine. Muriform spores are unknown in the order, and, with the possible exception of *Thelocarpon*, none is known to be lichenized. Conidial stages tend to play an important role in the life cycle and to be hyphomycetous, although pycnidia are produced by some genera.

Developmental criteria are critical in evaluating whether the Clavicipitales and Ostropales are related. If the Clavicipitales indeed possess true perithecia, then the evidence is against relationship. Doguet's (1960) account of perithecial formation in *Epichloe typhina* (Pers.) Tul. & Tul. leaves some doubt as to whether development is ascohymenial or ascolocular. The perithecial wall in this fungus appears at a rather late stage in development, after the asci have begun to differentiate, and is composed of hyphae much like those of the surrounding stroma. More information is needed on the development of other, non-stromatic Clavicipitales. If the fruitbody is viewed as a naked fascicle of asci lying within a vegetative stroma, the case for a relationship between the Clavicipitales and the Ostropales is fairly convincing.

Thelotremataceae

Modern lichenologists (Vězda, 1966; Hale & Culberson, 1970; Henssen & Jahns, 1974; Gilenstam, 1974) are unanimous in assigning the Thelotremataceae to the Ostropales. Some would also include the Graphidaceae, with lirellaform ascocarps, in this order; other assign them to a separate order, the Graphidales. The Graphidaceae will be omitted from this discussion since the arguments which apply to the Thelotremataceae also apply to the Graphidaceae, which have hysterothecial ascocarps and hence are less likely to be related to the Stictidaceae.

The Thelotremataceae is a large, distinctive family of predominantly corticolous, predominantly tropical, crustose lichens, characterized by immersed, orbicular fruitbodies with abundant true paraphyses, cylindrical, capitate, inamyloid unitunicate asci, periphysoids, and thick-walled graphidean spores. The apothecia resemble those of Stictidaceous fungi. Species with inconspicuous thalli have been described in *Stictis*, *Cryptodiscus*, and other fungal genera. Ascospores may be filiform, but are typically ovoid or fusiform. They are frequently muriform, and are not known to disarticulate at the septa.

The decision as to whether to include the Thelotremataceae in the Ostropales rests on the significance accorded the graphidean spore, since other fruitbody characters are obviously very similar and a lichenized habit is, at most, a useful generic character in the Ostropales. It might be argued that graphidean spores, which also occur in the Trypetheliaceae, a family of loculoascomycetous lichens with bitunicate asci, are an adaptation and examples of convergent evolution. If so, it is difficult to see why a thickened, laminate inner wall, peculiar sequence of septation, and J+ purple ascospores should invariably be correlated.

I chose to accept the Graphidales as a distinct order and to include the Thelotremataceae among them. *Ramonia* and *Gloeolecta*, which were transferred by Vězda (1966) from the Gyalectaceae to the Thelotremataceae, have thin-walled non-graphidean spores and should be retained in the Ostropales. These two genera are discussed briefly in section 9. It is distinctly possible that the Graphidales are more closely related to the Ostropales than either is to other orders of discomycetes.

Dermateaceae

If the Ostropales are viewed as inoperculate discomycetes, it is logical to compare them with the Helotiales and Phacidiales, the other two orders of inoperculate discomycetes. Among the Helotiales, the majority of immersed forms formerly assigned to the Stictidaceae are now accomodated in the Dermateaceae.

Immersed Dermateaceous fungi, notably members of the Pyrenopezizeae, such as *Hysteropezizella*, were long included in the Stictidaceae. There is little evidence that the two groups are closely related. Dermateaceous Ascomycetes are characterized by a fleshy parathecial excipulum of rather large, pseudoparenchymatous cells and asci which may be somewhat capitate, but, if capitate, are generally J+ blue at the apex. Filiform spores are rare. The hymenial gel is inamyloid. None are known to be lichenized.

A few genera accepted as Dermateaceous by Dennis (1968) or Korf (1973), which might be interpreted as intermediates, have probably been assigned to the wrong family. *Cryptodiscus* is quite remote from the Naevioideae and seems rather to be a member of the Ostropales related to lichens formerly included in the Gyalectaceae. *Propolis* (Fr.) Fr. may be more closely related to the Phacidiales. These two genera are discussed in greater detail in section 9.

Phacidiaceae

The Phacidiales, as currently delimited, contain two well-characterized families, the Hypodermataceae (or Rhytismataceae) and Cryptomycetaceae, and one poorly-defined dumping ground, the Phacidiaceae (Dennis, 1968). The taxonomy of immersed Ascomycetes which occur as saprophytes on decaying plant remains is extremely confused. *Phacidium abietinum*, the ultimate type of the Phacidiaceae, is a parasitic species with pointed J+ asci, and does not seem to be closely related to the Ostropales. On the other hand, *Propolidium* and *Delpontia*, with lenticular fruitbodies whose construction recalls that of *Phacidium*, have cylindrical, capitate, inamyloid asci. The muriform spores of *Delpontia* are also quite out of place in the Phacidiales as currently circumscribed. Available evidence suggests that there remains in the Phacidiales a residue of fungi whose affinities are with the Ostropales, rather than with *Phacidium* or *Hypoderma*. A systematic search for them is beyond the scope of this study.

The typical member of the Phacidiales may be distinguished from any member of the Ostropales by the thin-walled, pointed asci, which are quite distinct from the cylindrical, slightly thick-walled asci found in the few Ostropalean species which lack a prominent ascus cap. In addition, most immersed, stromatic Ascomycetes whose fruitbodies open by splitting the overlying substrate into distinct teeth are Phacidealean, rather than Ostropalean.

Patellariaceae and other Bitunicates

Several authors (Tilak & Kale, 1969; Malloch, *personal communication*) have suggested that the asci of Ostropalean fungi appear bitunicate. They are undeniably thick-walled in many species. In view of this, it would be useful to compare the Ostropales, particularly *Schizoxylon*, with bitunicate discomycetes which occur as saprophytes on dead wood - the Patellariaceae and Hysteriaceae.

According to Bellemère (1967), the apothecia of *Patellaria* possess both true paraphyses and a well-defined parathecium. The same seems to be true of *Buellia* and *Karschia*. The archaeascaceous ascus found in the Lecanorales contains the elements of a bitunicate ascus and it would seem reasonable to assume that the Patellariaceae are closely allied to the Lecanorales, with which they share such features as tough, persistent fruitbodies and an intensely amyloid hymenium. The apothecia of *Schizoxylon sepincola* appear superficially similar to those of *Karschia*, but lack a parathecium.

In many species of *Schizoxylon* the asci do not conform to the Ostropalean model, but begin development as uniformly thick-walled structures and lack a well-defined cap at maturity. Although I have seen many discharged asci of *Stictis*, and am convinced that this genus is functionally unitunicate, I am less sure of *Schizoxylon*.

The asci of Ostropales contain little epiplasm; it is difficult to imagine how imbibition of water by this epiplasm could provide the force necessary to expel the ascospores. An alternative hypothesis is to postulate that the thickened endoascus imbibes water and functions in spore discharge in much the same way that the endoascus of a bitunicate Ascomycete does, but that the two wall layers do not separate. In this case a connection to the Patellariaceae might be defended.

Members of the Hysteriales lack a parathecium and are discostromatic, hence they are more likely to be confused with members of the Ostropales than are the Patellariaceae. Bitunicate asci are difficult to demonstrate in specimens of filiform-spored fungi. In this connection it is useful to remember that Ostropalean ascocarps, although sometimes hysterothecial in face view, are orbicular in cross section and contain abundant true paraphyses.

Gyalectaceae

Few of the genera included by Zahlbruckner when he erected the Gyalectaceae are now considered to be closely related to *Gyalecta*. *Gloeolecta* and *Ramonia* differ little from typical members of the Stictidaceae and are included in part 9 as accepted members of the Ostropales.

Gyalecta is characterized by initially immersed apothecia which have a prominent, rather gelatinous, radiating paraplechtenchymatous margin. According to Letrouit-Galinou (1974) development is parathecial and approaches the Lecanoralean pattern. Numerous true paraphyses are present, and the asci are uniformly thin-walled, without obvious apical structures. Ascospores are thin-walled and may be transversely septate or muriform. *Gyalecta* has little in common with the Ostropales.

Coenogonium, sometimes set apart in a separate family, the Coenogoniaceae, has superficial, sessile apothecia which have a pseudoparenchymatous margin of large globose cells. Development has not been studied, but the complex nature of the margin suggests that it is parathecial. The asci are surrounded by true paraphyses imbedded in a matrix which turns faintly blue in iodine, and are thin-walled, with a prominent J+ apical ring. *Coenogonium* has many characters in common with the Helotiales but appears to be totally unrelated to the Ostropales. *Dimerella*, with a complex, sessile apothecium and inamyloid asci, seems likewise to have little in common with any of the Stictidaceae. *Absconditella* is strikingly similar to *Cryptodiscus* and is accepted as Ostropalean in section 9.

VIII. Key to the Genera of Ostropales and to Genera likely to be Confused with them

To assist the reader in identifying fungi which superficially resemble Stictidaceae, but which belong to unrelated groups, excluded genera have been incorporated in the key. Only Ascomycetes are treated. It should be emphasized that treatment of groups other than the Ostropales is fragmentary and that generic identifications in the Loculoascomycetes, Graphidales, Helotiales, and Phacidiales should be checked against references treating the group concerned.

1. Pseudoparaphyses and functionally bitunicate asci present. Loculoascomycetes (2)
1'. Interascal tissue consisting of true paraphyses, anastomosing netlike paraphysoids, or a non-filamentous matrix; asci not functionally bitunicate, although sometimes thick-walled (5)
    2 (1). Fruitbodies opening by a slit, or by irregularly tearing a covering stroma (3)
    2' (1). Fruitbodies opening by a broad, orbicular pore (4)
3 (2). Ascospores muriform, brown. *Melittosporium*
3' (2). Ascospores transversely septate. Various fungi in the Lophiaceae and Lophiostomataceae. See Goree (1974) for species of *Glyphium* incorrectly referred to *Acrospermum*, and the comments on *Ostropella* under *Ostropa* in section 9.
    4 (2'). Ascospores tranversely septate, colorless. *Xylopezia*
    4' (2'). Ascospores muriform. *Mycoglaena*
5 (1'). Fruitbodies perithecia, superficial or immersed in a true stroma. *Acrospermum*, Clavicipitaceae, and other fungi not considered related to the Ostropales.
5' (1'). Fruitbodies apothecia, or, if perithecioid, then immersed in pseudostroma, non-stromatized substrate, or lichen thallus (6)
    6 (5'). Fruitbodies true apothecia, with a well-defined parathecium; periphysoids absent. Helotiales, Lecanorales (7)
    6' (5'). Fruitbodies apothecioid or perithecioid, lacking a parathecium, usually initially immersed; periphysoids present or absent. Phacidiales, Ostropales (13)
7 (6'). Apothecia typically ephemeral. Asci thin-walled, usually with a well-defined apical apparatus. Hymenium J- or J+, but never firmly cemented in an intensely J+ blue gelatinous matrix. Helotiales (8)
7' (6'). Apothecia though, long-lived, usually associated with a lichen thallus. Asci thick-walled, without a defined apical apparatus, or appearing bitunicate; hymenial gel intensely J+ blue, rarely J-. Lecanorales (12)

8 (7). Ectal excipulum pseudoparenchymatous, or globose to angular, isodiametric cells; granulate septate hairs absent. (9)

8' (7). Ectal excipulum paraplechtenchymatous, with or without granulate hairs (10)

9 (8). Ascospores filiform; apothecia superficial, sessile or stalked, fleshy, aquatic. *Vibrissea*

9' (8). Ascospores usually ovoid, at most long-cylindrical, immersed in plant debris, not aquatic. Immersed members of the Dermateaceae. *Diplonaevia, Eupropolella, Habrostictis, Hysteropezizella, Hysterostegiella, Karstenia, Naevala* (see *Naevia*)*, Ocellaria, Phragmonaevia, Ploettnera, Trochila.*

10 (8'). With granulate septate hairs. Hyaloscyphaceae. *Stegopeziza*

10' (8'). Without granulate septate hairs (11)

11 (10'). Immersed in dead wood, not obviously associated with a lichen thallus. (Members of the Leotiaceae, most of which are unlikely to be confused with Ostropales, will key out here). *Xylogramma*

11' (10'). Sessile on a crustose lichen thallus. (Some members of the Gyalectaceae will key out here).

12 (7'). Fruitbodies orbicular, superficial. (Scolecosporous members of the Lecidiaceae will key out here). *Phaneromyces? Agyrium*

12' (7'). Fruitbodies immersed in wood, lirellaform. *Xylographa*

13 (6'). Ascospores graphidean, with a lenticular cell lumen and unequally thickened, multilayered (light microscope) cell wall, J+ red or purple (difficult to see in brown-spored species). Graphidales (14)

13' (6'). Ascospores not graphidean, the cell lumen cylindrical, the wall thin or uniformly thickened, J- (15)

14 (13). Periphysoids present. Apothecia orbicular. Thelotremataceae.

14' (13). Periphysoids absent. Apothecia usually lirellaform. Graphidaceae.

15 (13'). Fruitbodies lenticular in cross section, with a meristematic pericentral plexus, opening by a slit or teeth along preformed lines of dehiscence; asci cylindrical, thin-walled, pointed at the apex, J+ or J-, never with a massive apical thickening. Phacidiales* (16)

15' (13'). Fruitbodies orbicular, cylindric, or lageniform in cross section, rarely broader than tall, without a meristematic pericentral plexus, opening by a pore or slit, or by splitting the substrate irregularly; asci cylindrical, J+ or J-, thick-walled when young, with a distinct J- apical thickening (except in some species of *Schizoxylon*); true paraphyses always present (24)

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* An artifical key based on spore characters is used in order to incorporate several genera whose affinities at the family level are unknown.

16 (15). Ascospores cylindrical, acicular, or filiform. (17)

16' (15). Ascospores ovoid, allantoid, or fusiform (22)

17 (16). Apothecia lirellaform, opening by a longitudinal slit (18)

17' (16). Apothecia orbicular or irregular in outline, opening by teeth (19)

18 (17). Ascospores ciliate. *Irydyonia*

18' (17). Ascospores non-ciliate. *Naemacyclus*

19 (17'). Paraphyses swollen at the tip, forming a brown epithecium. *Moutoniella*

19' (17'). Paraphyses not swollen at the tip, colorless (20)

20 (19'). Ascus apex J+ blue. *Lasiostictis*

20' (19'). Ascus apex J- (21)

21 (20'). Covering layer thick, brown, non-crystalliferous. On bark. *Cerion*

21' (20'). Covering layer reduced, crystalliferous. On leaves. *Propolis*

22 (16'). Asci polysporous. *Propolina, Carestiella?*

22' (16'). Asci 8-spored (23)

23 (22'). Fruitbodies small, with a dark margin. *Laquearia*

23' (22'). Fruitbodies large, effuse, with a reduced, colorless margin. *Propolomyces*

24 (15'). Fruitbodies true perithecia, without prominent crystalline layers in the wall. (Immersed Sphaeriales will key out here). *Lindauella*

24' (15'). Fruitbodies apothecioid, or, if perithecioid, then with crystalline inclusions in the walls and filiform spores (25)

25 (24'). Ascospores long-cylindrical to filiform; margin containing obvious crystalline inclusions. Ostropales sensu stricto (26)

25' (24'). Ascospores ovoid, or margin without crystalline inclusions. Residual Stictidaceae and residual Gyalectaceae (38)

26 (25). Periphysoids present, at least in the upper part of the margin (27)

26' (25). Periphysoids absent.(37)

27 (26). Apothecia opening by a transverse slit (28)

27' (26). Apothecia opening by a pore, or by splitting irregularly (30)

28 (27). Periphysoids extending the entire length of the margin; hymenium readily separating from the margin when dry. *Stictis* sect. *Lichenopsis*

28' (27). Periphysoids in the upper part of the margin only; hymenium not readily separating from the margin when dry (29)

29 (28'). Apothecia vertical, orbicular in cross section, erumpent. *Ostropa*

29' (28'). Apothecia oblique, cylindrical or lageniform in cross section, immersed. *Robergea* p.p.

30 (27'). Periphysoids present only in the upper part of the margin; apothecia lageniform. *Robergea* p.p

30' (27'). Periphysoids extending the entire length of the margin; apothecia orbicular in cross section (31)

31 (30'). Marginal hyphae with pigmented walls (32)

31' (30'). Marginal hyphae with colorless walls (pigmented host tissue may be incorporated in the margin) (34)

32 (31). Obvious lichen thallus present. *Conotrema*

32' (31). Lichen thallus absent (33)

33 (32'). Asci J-. Ascospores not regularly disarticulating. *Stictis* sect. *Cyclostoma*

33' (32'). Asci J+ blue. Spores regularly disarticulating into minute part-spores. *Acarosporina*

34 (31'). Apothecia opening by splitting the overlying epidermis into lobes; spores disarticulating (A few species of *Stictis* sect. *Stictis*, below, have irregularly disarticulating spores; these open by a pore). *Propoliopsis*

34' (31'). Apothecia not opening by splitting the overlying substrate into lobes, either obviously poricidal or with non-disarticulating spores (35)

35 (34'). Margin annulate, remaining for a long time closed, finally opening irregularly. *Stictis* sect. *Lichenopsis*

35' (34'). Margin not annulate, soon opening by a pore (36)

36 (35'). Parasitic on living leaves. *Biostictis*

36' (35'). On woody or herbaceous material, never on living leaves, predominantly (perhaps exclusively) saprophytic. *Stictis* sect. *Stictis*

37 (26'). Ascocarps superficial on living leaves, minute, colorless. *Lillicoa*

37' (26'). Ascocarps immersed or erumpent on wood, bark, or herbaceous stems, larger, usually brown (if the ascocarps are minute and entirely non-crystalline, go to 45, below). *Schizoxylon*

38 (25'). Obvious lichen thallus present. Residual Gyalectaceae (39)

38' (25'). Lichen thallus absent. Residual Stictidaceae (41)

39 (38). Periphysoids or homologous structures present; hymenium splitting away from the margin when dry (40)

39' (38). Periphysoids absent; margin not splitting away from the hymenium when dry, algal host protococcoid. *Absconditella*

40 (39). On bark. Algal host Trentepohlia. *Ramonia*, *Thelopsis*

40' (39). On soil and mosses; algal host *Gloeocystis*. *Gloeolecta*

41 (38'). Periphysoids present (42)

41' (38'). Periphysoids absent (45)

42 (41'). Margin containing abundant crystals (43)

42' (41'). Margin not containing crystals. *Melittosporiella* and de-lichenized *Ramonia*

43 (42). Spores septate (44)

43' (42). Spores unicellular. *Stictophacidium*

44 (43). Spores transversely septate. *Propolidium*

44' (43). Spores muriform. *"Platysticta"*

45 (41'). Margin present. Spores transversely septate (46)

45' (41'). Margin not differentiated. Spores muriform. *Delpontia*

46 (45). Ascocarps deeply immersed, colorless or pale

brown (47)

46' (45). Ascocarps erumpent. Margin dark brown; paraphyses not knoblike. *Odontotrema*

47 (46). On lichen thalli. Ascospores filiform. *Nanostictis*

47' (46). On wood. Ascospores commonly ovoid, rarely filiform; paraphyses knoblike. *Cryptodiscus*

IX. Included and Excluded Genera

The genera included in the Stictidaceae by Clements and Shear (1931), as well as genera assigned to either the Stictidaceae or Ostropales by other authors, or claimed to be synonyms of genera of the Stictidaceae or Ostropales, are listed below in alphabetical order. Genera excluded from the Ostropales are enclosed in parentheses. Following the generic name, the place and date of publication, holotype or lectotype species, nomenclatural synonyms, taxonomic synonyms, and a discussion of the taxonomy of the genus appear. Detailed treatments of individual species in the accepted genera *Stictis*, *Schizoxylon*, *Robergea*, and *Cryptodiscus* appear at the end of the alphabetical list; individual species in other accepted genera appear under the generic headings.

For purposes of priority a starting point date of 1 May 1753 is assumed. I believe that there is no other reasonable way to deal with the nomenclature of a group which contains both lichenized and non-lichenized members than to assume a uniform starting point date for both. For the convenience of readers, validating authors for pre-1821 genera are included. In no case does the assumption of a 1753 starting point date result in the adoption of a generic name other than the one considered correct under the current International Code of Botanical Nomenclature (Stafleu et al., 1972). In several cases genera are based on misidentified specimens or descriptions which do not agree with the type specimen of the species. I have assumed that the type of the genus and the application of the name are determined by the original type specimen, and not by the misidentified material examined by the author of the generic name.

(1). *ABSCONDITELLA* Vežda, Preslia 37: 238 (1965)

Holotype species: *Absconditella sphagnorum* Vežda & Poelt, *ibid.:* 242 (1965) (Figure 6)

Apothecia at first immersed in substrate and lichen thallus, erumpent or remaining immersed, the margin narrow, colorless, entire, the disc deeply immersed, not splitting away from the margin when dry. Margin non-crystalline, paraplechtenchymatous, of colorless, narrow-diameter hyphae, not notably gelatinous. Distinct periphysoidal hyphae are absent, although long hyphae on the inner face of the margin may represent periphysoids which have elongated and function as paraphyses, as in *Gyalecta*. Substrate tissue may be included in the margin. Hymenium entirely J-. Paraphyses numerous, filiform, with a knoblike apex. Asci small, cylindrical, with thin lateral walls and a distinct apical cap, apparently not bitunicate. Spores 8/ascus, uniseriate, ovoid, transversely septate, non-graphidean.

Forming lichen associations with protococcoid algae on wood and mosses in cool humid climates. *Absconditella* differs from *Cryptodiscus* only in possessing a distinct lichen thallus. *A. trivialis* is scarcely distinguishable from *C. pallidus* and might conceivably represent the same species. The two genera should perhaps be merged.

SPECIMENS EXAMINED: EUROPE: Sweden (Herb. Sherwood, Vězda, Lichenes selecti exs. 352, on *Sphagnum*, authentic specimen of *A. sphagnorum*). NORTH AMERICA: USA (Herb. Sherwood 306, on wood, Washington state, det. Vězda as *A. trivialis*).

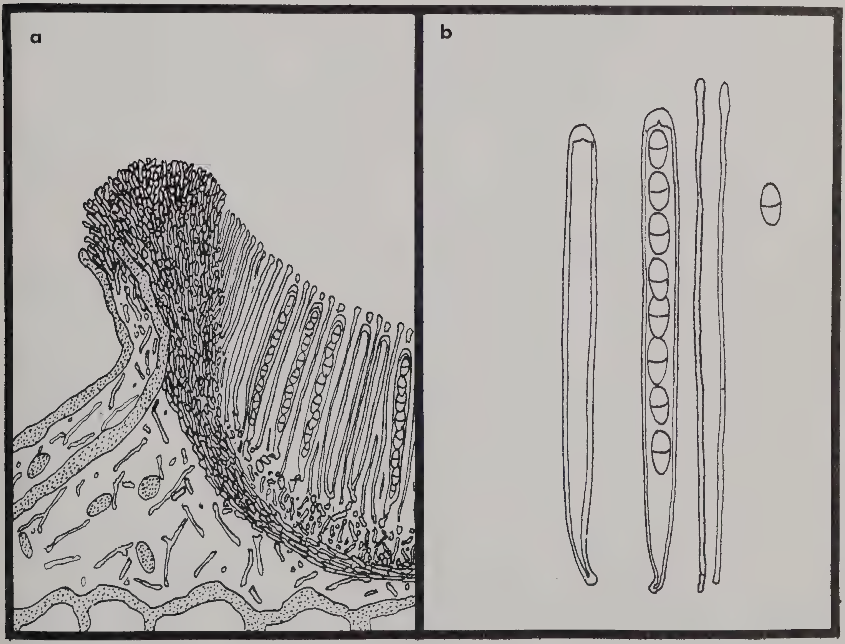

FIGURE 6. *Absconditella sphagnorum*. a. Cross section of margin, x375. b. Asci, paraphyses, and spores, x750. Drawn from A. Vězda, Lichenes selecti exs. 352

(2). ACAROSPORINA Sherwood, gen. nov.

Holotype species: *Schizoxylon moniliferum* Ell. & Ev., Bull. Torrey Bot. Club 11: 42 (1884)

Ascocarpi primum immersi, erumpescentes, profunde cupulati, margine integro, nigro, disco pallide ochraceo vel brunneo.

Margo strato crystallino prominente atque paraphysoideis praeditis, siccus ab hymenio se abrumpens. Asci cylindrici, apice incrassatae. Sporae filiformes, multiseptatae, ad septa se disjungentes et articulos minutos innumeros formantes.

HOLOTYPUS: *Schizoxylon moniliferum* Ell. & Ev.

Etymology: From *Acarospora,* (Greek: mite-spored), a genus of lichens with polysporous asci and minute spores.

Apothecia at first immersed, becoming erumpent, fairly large for Ostropalean ascocarps, the margin entire, brown or black, the disc deeply immersed, pale ochraceous or dark, splitting away from the margin when dry. Margin in cross section distinctly 3-layered, with a thick, dark wall, distinct crystalline layer, and abundant periphysoids. Subhymenium resting on host substrate or on a continuation of the wall, of small, colorless, angular cells. Paraphyses numerous, filiform, usually branched. Asci cylindrical, with a distinct apical cap, the membrane J+ blue. Ascospores at first filiform and transversely multiseptate, soon disarticulating into minute unicellular part-spores which elongate after disarticulation, so that the asci are eventually filled with innumerable minute unicellular part-spores, more than 8-seriate in the ascus.

On bark and bark cankers, apparently parasitic. Disarticulating spores alone are not enough to separate the genus from *Stictis* sect. *Cyclostoma*. Blueing of the ascus membrane in iodine, extremely minute part-spores, and the apparently parasitic habit of the species also serve to isolate *Acarosporina* taxonomically from *Stictis* and *Schizoxylon*. The three species are separated primarily on part-spore dimensions. Saprophytic specimens with much larger part-spores should be referred to *Stictis* sect. *Cyclostoma;* cfr. *Stictis stigma*.

(1). ACAROSPORINA MONILIFERA (Ell. & Ev.) Sherwood, comb. nov.

Figure 7

Apothecia at first immersed, later opening by a pore and becoming erumpent, often clustered, 1.0-1.5 mm diam., the margin thick, entire, black, somewhat grey-pruinose, the disc deeply immersed, dark brown, splitting away from the margin when dry.

Accessory thalline margin prominent. Wall 50-75 µm thick, of interwoven hyphae 3.0 µm diam.; crystalline layer distinct, but rather narrow. Periphysoids 70 x 2.0 µm, branched, forming a compact layer. Subhymenium c. 50 µm thick, of dark wall tissue. Paraphyses numerous, filiform, branched and circinate apically, barely enlarged, strongly J+ blue. Asci 250-300 x 6-8 µm, the cap 3.0 µm thick, diffusely J+ blue near the apex. Ascospores 8, somewhat shorter than the asci, at first very closely multiseptate, soon breaking up into innumerable globose part-spores 1.5 µm

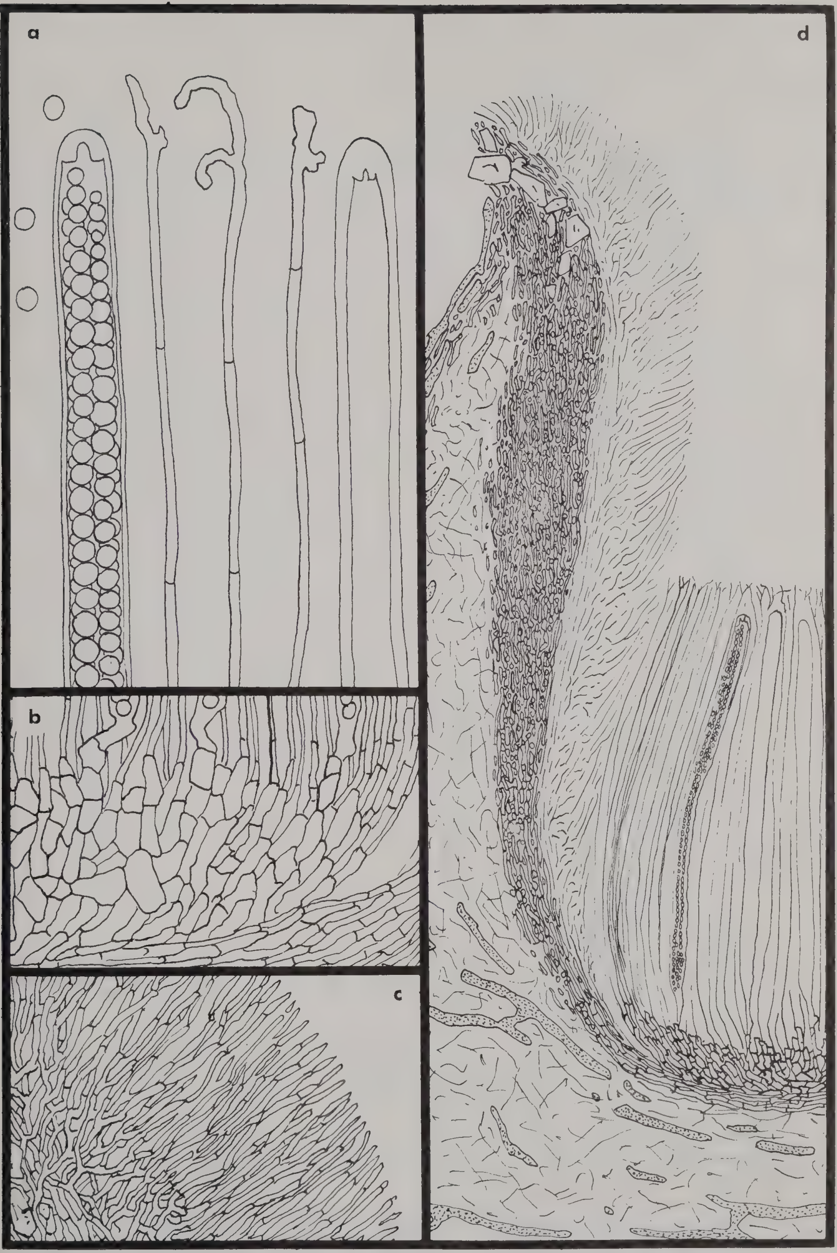

FIGURE 7. *Acarosporina monilifera*. a. Detail of asci and paraphyses, x 1500. Drawn from NY-Haines 2686. b. Junction of margin and subhymenium, x750. c. Periphysoids, x375. d. Cross section of margin, x150. b-d drawn from NY-Ellis 20.I.1882.

in diameter.

On cankers of *Quercus* and *Fagus*, eastern North America. Apparently uncommon. No pycnidial stage was found in any of the specimens examined.

SPECIMENS EXAMINED: NORTH AMERICA: USA (NY, on *Fagus*, New York, Haines 2686, 10.X.1973; on *Quercus*, Newfield N.J., 4.I.1880, Ellis, lectotype, designated here, of *Schizoxylon moniliferum;* Ellis 20.I.1882, presumed paratype).

(2). ACAROSPORINA MICROSPORA (Davidson & Lorenz) Sherwood, comb. nov.

≡ *Schizoxylon microsporum* Davidson & Lorenz, Phytopathology 28: 743 (1938)

Apothecia at first immersed in wood or bark, opening by a pore, becoming somewhat erumpent, 0.7-1.0 mm diam., the margin thick, dark, entire, externally somewhat white-pruinose, the disc deeply cupulate, pale ochraceous. Margin in cross section essentially indistinguishable from that of *A. monilifera*. Asci 170-200 x 7-8(-12) μm, the ascus membrane diffusely J+ blue, the cap 2.5-3.0 μm thick. Part-spores simple (or rarely septate and then longer), more than 8-seriate, 2-3 x 1.0 μm. Paraphyses simple, filiform, not enlarged at the apex, not circinate. If, as Davidson and Lorenz (1938) maintain, the spores are initially filiform, then the part-spores must elongate after disarticulation.

Pycnidia numerous, at first immersed, then erumpent, dark-walled, without a defined opening, white-pruinose, containing a single cavity. Conidiophores in a single layer, simple, probably phialidic. Conidia colorless, cylindrical or slightly curved, 2.5 x 1.0 μm.

On bark cankers of maple, eastern North America. Apparently rare.

SPECIMEN EXAMINED: NORTH AMERICA: USA (NY-Ellis 210, Newfield, N.J., labelled *S. ohiense* Ell. [ined.]).

(3). ACAROSPORINA BERBERIDIS Sherwood, spec. nov.

Figure 8

Ascocarpi primum immersi, profunde cupulati, 0.4 usque ad 0.6 mm diam., margine integro, brunneo, disco pallide ochraceo. Margo in sectione transversali 100 μm crassus, siccus ab hymenio se abrumpens, hypharum pariete 2.0 μm diam., brunneo. Stratum crystallinum 20 μm crassum. Periphysoidea 50-60 x 2.0 μm, ramosa, brunnea. Paraphyses filiformes, simplices, 150 x 1.0 μm, achromae, in iodo caerulescentes. Asci 135-150 x 5-6 μm, apice 1.0 μm crassi, 8-spori. Sporae 125-140 x 1.2 μm, cellulis 1.0 μm longis, ad septa se disjungentibus et articulos simplices 1.2 μm longos foramtibus.

HOLOTYPUS: CUP-55527 (= Fungi of West Pakistan 16544), on a dead branch of *Berberis ceratophylla*, Loon Bagla, Muzaffarabad, 23.VII.1963.

Apothecia deeply immersed, raising the bark into small

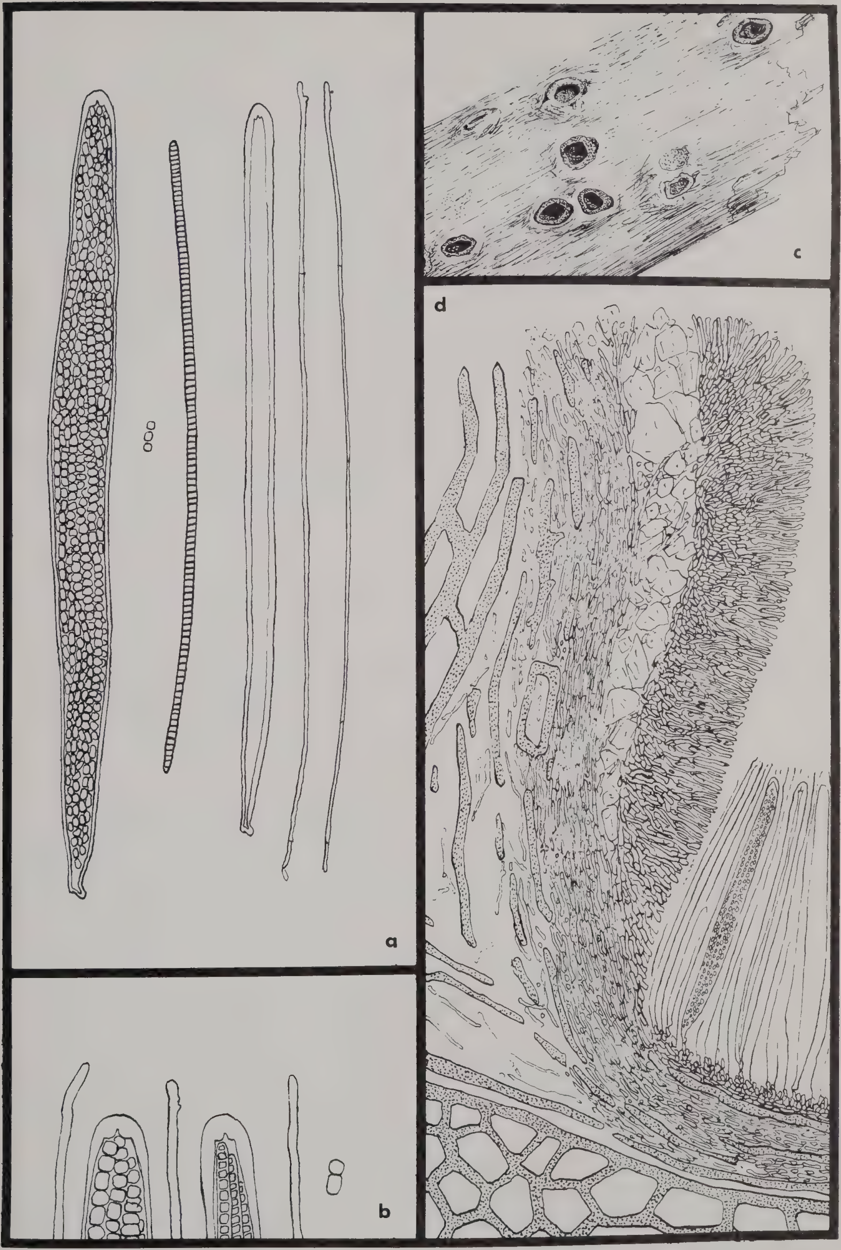

FIGURE 8. *Acarosporina berberidis*. a. Asci, paraphyses, ascospores, and part-spores, x750. b. Detail of apices of paraphyses and asci, x1500. c. Habit sketch, x7.5. d. Cross section of margin, x300. Drawn from the holotype.

pustules, becoming somewhat erumpent, 0.4 - 0.6 mm diam., the margin entire, brown, barely pruinose, the disc deeply immersed, pale ochraceous, splitting away from the margin when dry.

Accessory thalline margin fairly prominent. Stroma none. Margin in cross section c. 100 µm thick, the wall 20 µm thick, of pale brown, non-carbonized hyphae 2.0 µm diam.. Crystalline layer c. 20 µm thick, distinct but not prominent. Periphysoids 50-60 x 2.0 µm, colorless in the part adjoining the hymenium, brown above, branched near the base, forming a compact layer. Subhymenium colorless, 15-20 µm thick, resting directly on host tissue. Paraphyses simple, filiform, colorless, barely enlarged above, J+. Asci 135-150 x 5-6 µm, the cap 2.5 µm thick, the membrane blueing diffusely in iodine near the apex. Ascospores 8, 125-140 x 1.2 µm, at first very closely septate, the cells not over 1.0 µm long, soon falling apart into innumerable globose part-spores 1.2 µm diam.

On branches of *Berberis*, Pakistan. Distinguished from *A. monilifera* by non-circinate paraphyses, smaller part-spores, and lack of a dark wall layer beneath the subhymenium.

SPECIMENS EXAMINED: See holotype, above.

(3). *(ACROSPERMUM)* Tode, Fungi Meckl. 1: 8 (1790)

Validated: Fries, Syst. Mycol. 2(1): 244 (1822)
Lectotype species: *Acrospermum compressum* Tode, l.c., designated by Clements and Shear (1931)
= *Xyloglossum* Pers., Traité champ. comest. 144 (1818)
≡ *Scleroglossum* Pers. apud Mougeot & Nestler, Stirp. Crypt. Vogeso-Rhen. 671 (1820)

The affinities of *Acrospermum* have long been a subject of debate. The mature fruitbody consists of a solitary, fleshy, flattened perithecium, opening by a pore, soon erumpent and seated on a stalklike base. Unbranched paraphyses and cylindrical J- asci containing filiform spores constitute the hymenium. Although included in the Ostropales by Dennis (1968), this disposition has been questioned by subsequent authors. In the Fungi, Volume IV-A it appears in both the Clavicipitaceae (Müller & von Arx, 1973) and the Stictidaceae (Korf, 1973). O. Eriksson (1967) considered *Acrospermum* to be a Loculoascomycete with bitunicate asci. Fuckel (1870) erected a separate family, the Acrospermataceae (incorrectly ascribed to Rehm by Cooke & Hawksworth, 1970) for *Acrospermum*.

Brandriff (1936) studied development of *A. compressum*, which she interpreted as Dothidealean (*i.e.* ascolocular). The ascocarp originates as an undifferentiated stromatic body in which the internal hyphae elongate vertically. These disintegrate and are replaced by a pad of ascogenous hyphae giving rise to the asci and paraphyses. In the mature ascocarp the wall consists of an outer, dark-colored layer 1-2 cells thick (stroma), a fleshy, colorless, hyphal layer, and an inner layer of compacted colorless hyphae. Brandriff states that this is not true perithecial wall, but compacted stroma..

If correct, this developmental sequence suggests that of *Epichloë typhina*, as interpreted by Doguet (1960). I am unconvinced that the asci of *Acrospermum* are functionally bitunicate. The thickened inner wall remains firmly attached to the outer wall when the ascus is broken. Free ends of the interascal filaments suggest that they are true paraphyses. I am inclined to agree with Müller and von Arx that *Acrospermum* is related to the Clavicipitaceae. In any case, it is remote from *Stictis* and *Ostropa*.

SPECIMENS EXAMINED: NORTH AMERICA: USA (Herb. Sherwood 359, *A. graminum*, on *Lolium*, Oregon, 2.III.1972; 1211, on grass, Oregon, 17.VI. 1973).

(4). *AGYRIELLA* Ell. & Ev., Bull. Torrey Bot. Club 24: 470 (1897)

Holotype species: *Agyriella bethelii* Ell. & Ev., l.c.
≡ *Agyriopsis* Sacc. & Sydow
≡ *Bisbyella* Boedijn
= *Schizoxylon* Pers.

Agyriella Ell. & Ev. is a later homonym of *Agyriella* Sacc. (Hyphomycetes). *A. bethelii* is discussed below, under *Agyriopsis* and *Schizoxylon*.

(5). *AGYRIOPSIS* Sacc. & Sydow, Syll. Fung. 14: 805 (1899)
Holotype species: *Agyriella bethelii* Ell. & Ev.
≡ *Agyriella* Ell. & Ev.
≡ *Bisbyella* Boedijn
= *Schizoxylon* Pers.

Agyriopsis is an avowed substitute for *Agyriella* Ell. & Ev. Cash (1943) transferred the type species to *Schizoxylon*. The somewhat atypical fleshy margin and sparingly branched paraphyses are inadequate justification for segregation into a separate genus. *A. bethelii* is redescribed below as *Schizoxylon ligustri*.

(6). *(AGYRIUM)* Fr., Syst. mycol. 2(1): 231 (1822)
Lectotype species: *Stictis rufa* Pers., Obs. mycol. 2: 73 (1799), selected by Clements and Shear (1931), but see discussion below.

Although the type species was included by Persoon in his original concept of *Stictis*, *Agyrium* has never subsequently been included in the Stictidaceae. It became the basis for a separate family, Agyriaceae Corda (1838). Poelt (1973) revived the family name Agyriaceae, using it in a restricted sense for *Agyrium* and *Xylographa*. Both may be related to the Lecideaceae, which is where Dennis (1968) classified *Agyrium*.

The fruitbodies of *A. rufum* are small, superficial, gelatinous, reviving apothecia with a reduced excipulum and a hymenium which blues diffusely in iodine. The asci are thick-walled, lack an obvious apical mechanism, and contain

8 unicellular colorless ovoid ascospores.

The name *Agyrium* is invalidly published as a nomen nudum on page LV of the first volume of Fries's Systema mycologicum. In a footnote on this page, Fries declares the type of *Agyrium* to be *Tremella cinnabarina* Bulliard. *T. cinnabarina* appears as a questionable species in volume 2 of Systema mycologicum and is not transferred to *Agyrium*. Since there is no reference in volume 2 to the typification in volume 1, this typification should be treated as invalid.

SPECIMENS EXAMINED: See *Stictis rufa*.

(7). *(APOSTEMIDIUM)* Karst., Bidrag. Kännedom Finlands Natur Folk 19: 15, 186 (1871)

Holotype species: *Peziza fiscella* Karst., Not. Sällsk. Fauna Flora Fenn. Forh. 10: 104 (1869)
≡ *Peziza* sect. *Apostemium* Karst., *Ibid.:* 104 (1869)
≡ *Vibrissea* sect. *Apostemium* (Karst.) Sánchez & Korf, Mycologia 58: 734 (1966)

The taxonomic position of *Apostemidium* is discussed under under *Vibrissea*, below. For complete generic synonymy, see Sánchez and Korf (1966).

(8). *(ASTERONAEVIA)* Petr., Ann. Mycol. 27: 408 (1929)

Holotype species: *Asteronaevia trichophori* Petr., l.c.
= *Hysteropezizella* Höhn.

According to Nannfeldt (1932), *Asteronaevia trichophori* is a synonym of *Hysteropezizella subsessilis* (Rehm) Nannf.

(9). *BIOSTICTIS* Petr., Sydowia 4: 357 (1950)

Holotype species: *Stictis rubiacearum* Pat., Bull. Soc. Mycol. France 11: 220 (1895).

Apothecia subepidermal, at first completely immersed, opening by a pore and enlarging gradually, the margin white, entire to crenulate but not distinctly toothed, pruinose, the disc moderately deeply immersed, splitting away from the margin when dry. Margin in cross section 3-layered, with a wall, crystalline layer, and sparse periphysoids, colorless or brown. Subhymenium resting directly on host tissue. Paraphyses numerous, filiform, simple or branched, J-. Asci cylindrical, with a distinct apical cap, J-. Ascospores filiform, colorless, transversely multiseptate.

On living leaves of Rubiaceae, tropical America. The genus differs from *Stictis* principally in its parasitic habit on living leaves. The two species recognized here are separated on marginal color and the shape of the ascospores.

(1). BIOSTICTIS PSYCHOTRIAE (Montagne) Sherwood, comb. nov.

≡ *Stictis psychotriae* Mont., Ann. Sci. Nat. Bot. sér. 2, 18: 246 (1842)
≡ *Propolis psychotriae* (Mont.) Mont., Syll. Gen. Spec. 246 (1856)

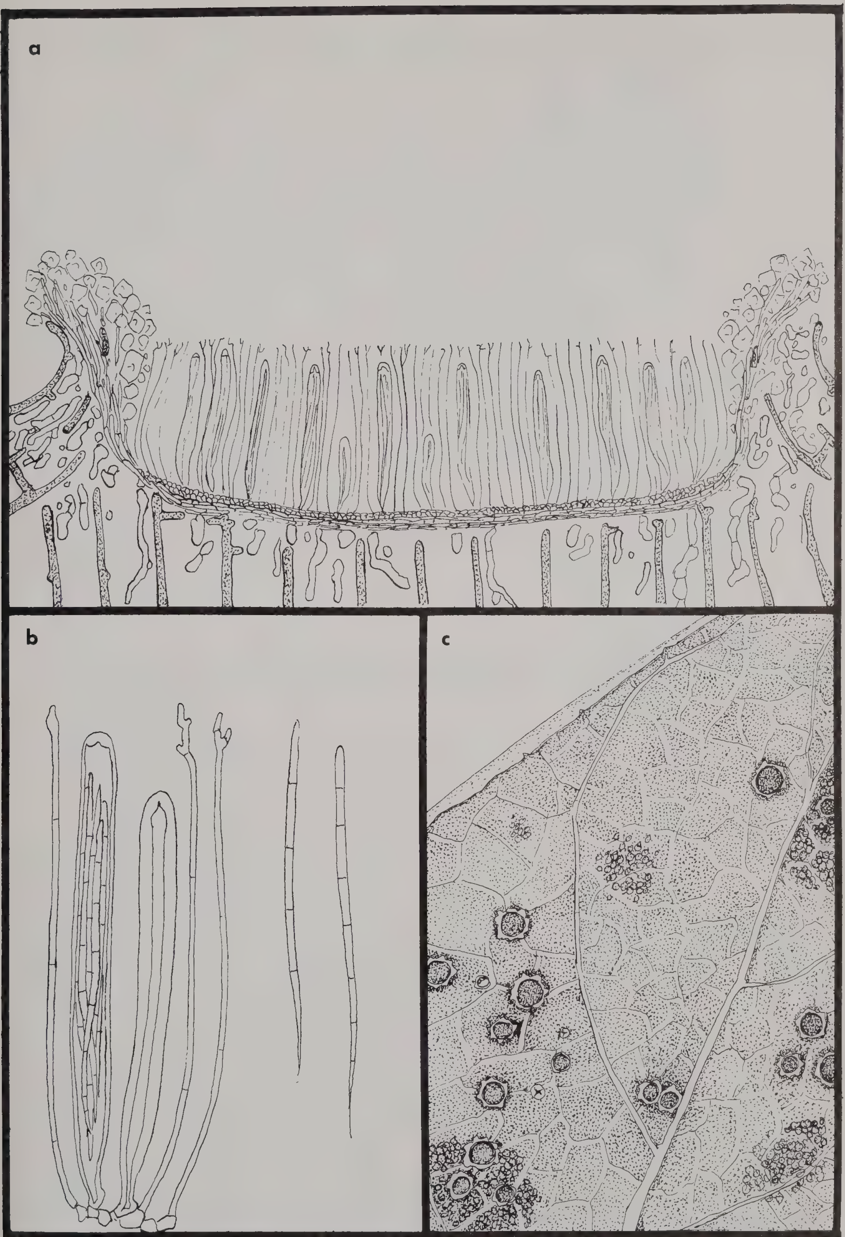

FIGURE 9. *Biostictis psychotriae*. a. Cross section of apothecium, x225. b. Asci, paraphyses, and spores, x750. c. Habit sketch, x7.5. Drawn from the type of *Stictis rubiacearum*.

= *Stictis rubiacearum* Pat., l.c.
≡ *Biostictis rubiacearum* (Pat.) Petr., Sydowia 4: 358 (1950)

Figure 9

Apothecia at first immersed in the mesophyll, hypophyllous, gregarious, often surrounded by discolored tissue, the margin white, entire to minutely lacerate, the disc moderately deeply immersed, flesh-colored, splitting away from the margin when dry. Margin, in cross section, 40-50 μm thick, that wall consisting of 4-5 layers of colorless hyphae 1.5 μm diam., lying parallel to the ruptured epidermis, the crystalline layer prominent, containing a few scattered colorless hyphae. A definite periphysoidal layer is absent. Subhymenium c. 10 μm thick, of small, colorless, angular cells, J-. Paraphyses numerous, filiform, 1.0 μm thick, 1-2x branched apically, J-. Asci 75-90 x 6-8 μm, thick-walled when young, the cap 2.5 μm thick, pierced by a narrow pore. Ascospores 8, 65-75 x 1.5(-2) μm, tapering below, usually 5-septate, not sheathed.

On leaves of *Psychotria* and unidentified Rubiaceous plants, widespread in tropical South America. In the field, infected leaves exhibit large yellow lesions with brown necrotic centers; dried leaves appear reddish. Both Patouillard and Lagerheim (1895) and Petrak (1950b) considered the imperfect stage to be *Fusidium violaceum* Pat. The fungus which Patouillard and Lagerheim describe is not present in Montagne's type of *Stictis psychotriae* or in the material which I collected in Peru and Colombia. In Lagerheim's collection it appears in scattered, superficial patches. I suspect that it is a hyphomycete which invaded the leaf during storage rather than the imperfect stage of *B. rubiacearum.*

SPECIMENS EXAMINED: SOUTH AMERICA: Surinam (PC, Splitgerber 1315, holotype of *S. psychotriae*). Ecuador (FH, San Jorge, Lagerheim, Juil 1892, holotype of *S. rubiacearum*) (NY, Sydow, Fungi Exotici 1215, on *Palicourea* sp., Tungurahina, Sydow 9.I.1938). Colombia (NY, on Rubiaceae, Dto. Antioquia, K.P. Dumont, S.E. Carpenter, M.A. Sherwood, 12.VIII 1976). Peru (NY-Pe-261, on Rubiaceae, Prov. Junín, K.P. Dumont, P. Buriticá, S.E. Carpenter, M.A. Sherwood, 28.VI.1976).

(2). BIOSTICTIS PUERTORICENSIS Sherwood, Spec. Nov.

Figure 10

Ascocarpi primum immersi, profunde cupulati, 0.3 usque ad 0.7 mm diam., margine integro, albo, disco nigro. Margo in sectione transversali 30 μm crassus, siccus ab hymenio se abrumpens, hypharum pariete 1.5-2.0 μm diam., pallide brunneo. Stratum crystallinum 25 μm crassum. Periphysoidea 10.0 x 1.5 μm, non ramosa. Paraphyses filiformes, simplices vel ramosae, 60 x 1.0 μm, apice ad 1.5 μm incrassatae, achromae, in iodo non caerulescentes. Asci 50-60 x 6.0 μm, apice 3-4 μm crassi, 8-spori. Sporae 40-50 x 2.0 μm, cellulis 2.5-3.5 μm longis.

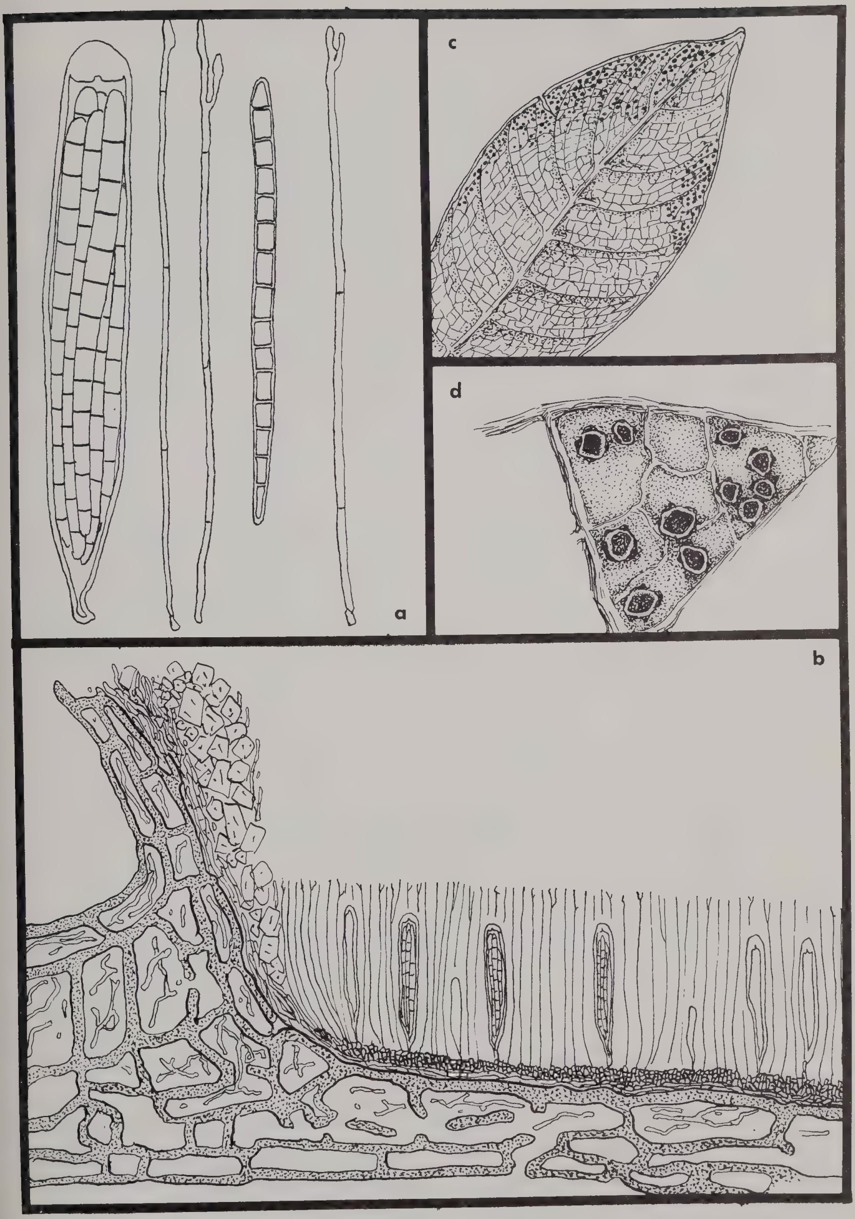

FIGURE 10. *Biostictis puertoricensis*. a. Ascus, paraphyses, and spores, x1500. b. Cross section of apothecium, x300. c. Habit sketch, x0.75. d. Habit sketch, x7.5. Drawn from the holotype.

HOLOTYPUS: CUP-PR-4251, On *Lasianthus moralesii* (Griesb.) C. Wright, Loquillo Mts., Chardon, Sept. 13-15, 1930, Puerto Rico, West Indies. ISOTYPI: NY, Herb. Sherwood.

Apothecia densely gregarious, sometimes becoming confluent, hypophyllous on living leaves, 0.3-0.7 mm diam., the disc black, moderately deeply cupulate, splitting away from the margin when dry, the margin entire to minutely crenulate, white, crystalline, surrounded by an accessory margin formed by the torn and blackened host epidermis. The entire apothecium is deeply sunken in the mesophyll and occupies most of the cross section of the leaf. Margin, in cross section, c. 30 μm thick, the wall consisting of 2-5 layers of interwoven non-carbonized brown hyphae 1.5-2.0 μm diam., the crystalline layer prominent, the periphysoids few, c. 10 x 1.5 μm, not forming a compact layer. Subhymenium c. 10 μm thick, resting on blackened and disintegrating host tissue, of small, colorless, angular cells, J-. Paraphyses numerous, filiform, 1.0 μm broad, enlarged to 1.5 μm at the apex, sometimes branched, J-. Asci 50-60 x 6-9 μm, the cap 3-4 μm thick. Ascospores 8, 40-50 x 2.0 μm, the cells 2.5-3.5 μm long, obscurely sheathed.

On living Rubiaceous leaves, Puerto Rico. The black color of the apothecium results from blackened host tissue beneath a colorless hymenium. *Biostictis puertoricensis* is distinguished from *B. rubiacearum* by having brown hyphae in the margin and somewhat broader, more closely septate spores. Small whitish tufts scattered among the apothecia contain hyphae and crystals, but no spores. No imperfect stage was found associated with this specimen.

SPECIMENS EXAMINED: See holotype, above.

(10). *BISBYELLA* Boedijn, Sydowia 5: 211 (1951) (an intentional name change).

Holotype species: *Agyriella bethelii* Ell. & Ev.
≡ *Agyriella* Ell. & Ev.
≡ *Agyriopsis* Sacc. & Sydow
= *Schizoxylon* Pers.

Peziza sect. *Agyriopsis* Karst., Not. Sällsk. Fauna Flora Fenn. Förh. 10: 104, 155 (1869) was published at a different rank and hence does not have priority over *Agyriopsis* Sacc. & Sydow (1889). *Bisbyella* is consequently a superfluous name.

(11). *(BRIARDIA)* Sacc., Rev. Mycol. (Toulouse) 7: 159 (1885)

Holotype species: *Briardia compta* Sacc., l.c.
= *Duebenia* Fr.

According to Nannfeldt (1929), *Briardia* is a synonym of *Duebenia*, a genus considered by Dennis (1968) to belong to the Dermateaceae. It appears in the Leotiaceae in Korf's (1973) keys to Discomycetes and Tuberales. Hein (1976) discusses the genus, whose affinities within the Dermateaceae are unclear.

(12). *CARESTIELLA* Bresadola,.Malpighia 11: 274 (1897)

Holotype species: *Carestiella socia* Bres., l.c.

Carestiella, with immersed immarginate ascocarps and polysporous J+ asci containing multiseptate, cylindrical spores, was considered Stictidaceous by Bresadola. According to Nannfeldt (1932) the type contained three apothecia and could not be examined; he did not believe that it was Ostropalean. It is remotely possible that a species of *Schizoxylon* with multiseptate part-spores, such as *S. microstomum*, might have generated the description given by Bresadola. It would be desirable to have additional material in hand before dissecting such a scant type specimen. For a description of *Schizoxylon microstomum*, see *Schizoxylon*, below.

(13). *(CERION)* Massee & Rodway, Bull. Misc. Inform. 1901: 159 (1901).

Holotype species: *Cerion coccineum* Mass. & Rodway, l.c.

Clements and Shear (1931) synonymized *Cerion* with *Stictis*. According to Dennis (1958), "in its asci, paraphyses, ascospores, excipular structure, iodine reaction and colouring, *Cerion* is totally unlike *Stictis*, to which Ainsworth and Bisby unaccountably refer it." He considered it related to *Colpoma* (Phacidiales: Rhytismataceae), but separable on paraphysis characters. My own observations confirm this. Originally described from Tasmania, *Cerion coccineum* also occurs in tropical America.

SPECIMENS EXAMINED: AUSTRALASIA (K, on wood, Tasmania, Rodway, holotype of *Cerion coccineum*) (NY, Isotype). NORTH AMERICA: Costa Rica (NY, on wood, Prov. San José).

(14). *(CHAILLETIA)* Karst., Bidrag. Kännedom Finlands Natur Folk 19: 21 (1871)

Holotype species: *Propolis sorbina* Karst., Fungi Fennici 839 (1869)
≡ *Karstenia* Fr.

Chailletia Karst. is a leter homonym of *Chailletia* DC (1811: Dichapetalaceae). The taxonomy of the genus is discussed under *Karstenia*, below.

(15). *(COCCOPEZIZA)* Hariot & Karsten, Rev. Mycol. (Toulouse) 12: 128 (1890)

Holotype species: *Coccopeziza ootheca* Har. & Karst., l.c.

The authors stated that *Coccopeziza* resembled *Propolidium*, from which it was distinguished by lacking paraphyses. I have seen no examples of this fungus, which is probably not Ostropalean.

(16). *CONOTREMA* Tuck., Proc. Am. Acad. Arts. Sci. 1: 278 (1848)

Holotype species: *Lecidea urceolata* Ach., Lich. Univ. 671 (1810)

≡ *Conotremomyces* Cif. & Tom., Atti Ist. Bot. Lab. Critt. Univ. Pavia ser. 5, 10: 63 (1953), nom. illegit.

Apothecia at first immersed, opening by a pore and finally becoming somewhat erumpent, with a thick, black, entire margin and deeply urceolate disc which splits away from the margin when dry. Margin in cross section 3-layered, with a distinct external carbonized stroma, non-carbonized wall, and distinct layer of periphysoids; crystalline layer indistinct or lacking. Subhymenium resting on an extension of the wall or on lichen thallus and fragments of disintegrating bark. Paraphyses numerous, filiform, J+ or J-, frequently pigmented. Asci long-cylindrical, J-, with a distinct apical cap. Ascospores filiform and transversely multiseptate, or short-cylindrical to ovoid, muriform in one species, frequently sheathed. Lichen thallus corticolous or saxicolous, crustose, superficial or partly immersed, homiomerous.

In his comprehensive treatment of the genus, Gilenstam (1974) states that *Stictis* and *Conotrema* are congeneric, but hesitates to unite them because of uncertainty in the circumscription of *Stictis*. The apothecia of *Conotrema* are indeed very similar to those of *Stictis* sect. *Cyclostoma*, such as *S. mollis*.

Stictis, as treated here, while no longer the obviously polyphyletic and poorly circumscribed genus that it was when Gilenstam monographed *Conotrema*, still encompasses far more variability than many established genera of the Helotiales and Phacidiales. It may ultimately prove desirable to break it up into a number of smaller genera. A massive dark excipulum lacking an obvious crystalline layer, sheathed spores, and marginal paraphyses, as well as symbiotic association with algae to form a lichen thallus, are characters of possible generic value separating *C. urceolatum* from *S. radiata*, the type of *Stictis*. Since *Conotrema* (1848) is one of the oldest available generic names in the Stictidaceae, it is nearly inevitable that splitting *Stictis* would result in reviving *Conotrema*. I have therefore declined to submerge it here, and accept it as a generic name for lichenized species otherwise referrable to *Stictis* sect. *Cyclostoma*.

SPECIMENS EXAMINED: AFRICA: Canary Islands (CUP-MM-506, *C. harmandii* (Pitard) Gilenstam, Tenerife, R.P. Korf, W.C. Denison, L.M. Kohn & M.A. Sherwood, 11.I.1976). NORTH AMERICA: USA (Herb. Sherwood 1856, *C. urceolatum* (Ach.) Tuck., West Virginia, Goree 3546)

(17). *CRYPTODISCUS* Corda

A detailed description of *Cryptodiscus*, and redescriptions of representative species, appear on page 88 following the list of included and excluded genera.

(18). *CYANOSPORA* Heald & Wolf, Mycologia 2: 209 (1910)

Holotype species: *Cyanospora albicedrae* Heald & Wolf, l.c.
= *Robergea* Desm.

Saccardo and Traverso (1911) synonymized *Cyanospora* with *Robergea*, a decision accepted by most subsequent authors.

and confirmed by my own investigations. A redescription of the type species appears under *Robergea*.

(19). *CYCLEDIUM* Wallr., Fl. Crypt. Germ. 2: 510 (1833)

≡ *Schizoxylon* Pers.

One of Wallroth's original species was *Cycledium sepincola* (Pers.) Wallr., the holotype species of *Schizoxylon*. *Cycledium* is a superfluous name, automatically typified by *Schizoxylon sepincola* under article 7 of the International Code of Botanical Nomenclature.

(20). *CYCLOSTOMA* Crouan & Crouan, Fl. Finist. 30 (1867)

Lectotype species (designated here): *Stictis arundinacea* Pers., Myc. Eur. 1: 336 (1822)
≡ STICTIS sect. CYCLOSTOMA (Crouan & Crouan) Sherwood, comb. nov.
?= *Cylindrina* Pat.

Cyclostoma is usually treated as a synonym of *Schizoxylon* (Fuckel, 1870; Nannfeldt, 1932), but apparently has never been typified. I have designated *C. arundinacea* (Pers.) Crouan & Crouan as the lectotype species, since the two species described as new by Crouan and Crouan are imperfectly characterized, and their types cannot be borrowed; the fourth included species was *Schizoxylon berkeleyanum*. In the treatment of *Stictis*, below, I have recognized section *Cyclostoma* for species with a wall layer of darkly pigmented hyphae.

(21). *CYLINDRINA* Pat., Bull. Soc. Bot. Fr. 33: 155 (1886)

Holotype species: *Cylindrina delevayi* Pat., l.c.

?= *Stictis* Pers.

The type specimen of *C. delevayi* contains one apothecium. Patouillard described the asci and spores as being like those of *Acrospermum*. The fruitbody is black, erumpent, 0.8 mm broad, 1.0 mm high, opens by a pore, lacks an obvious crystalline layer, has a hymenium which splits away from the margin when dry, and occurs on leaves of *Liparis* (Orchidaceae). The evidence suggests that this is a species of *Stictis* allied to *Stictis arundinacea*.

SPECIMEN EXAMINED: ASIA: China (FH-Patouillard, feuilles de *Liparis liliiflora* Reich, Yunnan, Abbé Delevay, holotype of *Cylindrina delevayi*)

(22). *DELPONTIA* Penzig & Saccardo, Malphighia 15: 220 (1901)

Holotype species: *Delpontia pulchella* Penz. & Sacc., l.c.

Apothecia immersed, irregular in outline, opening partially by a pore and partially by splitting the overlying substrate, colorless, the margin very reduced, consisting of a covering layer of a few colorless crystalliferous hyphae, devoid of differentiation into layers. True paraphyses numerous, filiform, J+. Asci cylindrical, somewhat thick-walled when young, with an indistinct J- cap. Ascospores colorless, ovoid, muriform. *D. pulchella* is the only species which certainly belongs in *Delpontia,* although *Stictis pteridina* (q.v.) may possibly belong here.

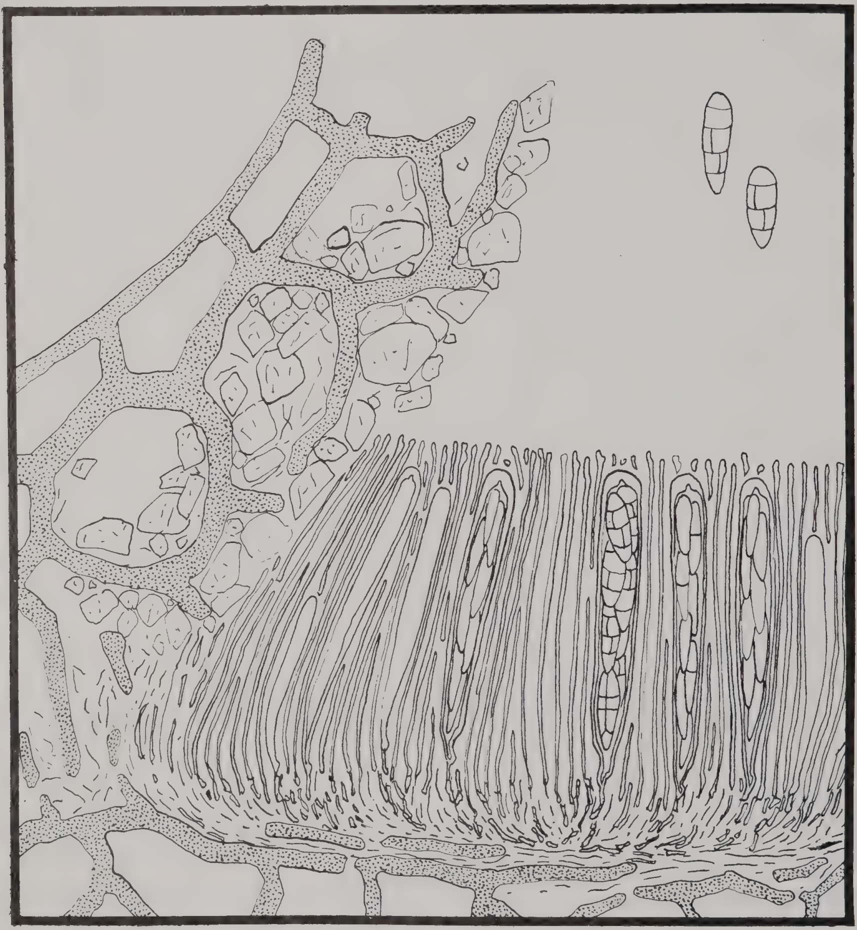

FIGURE 11. *Delpontia pulchella.* Cross section of apothecium, x750. Drawn from the holotype.

(1). DELPONTIA PULCHELLA Penz. & Sacc.

Figure 11

Apothecia at first completely immersed, opening partly by dissolving a pore in the substrate and partly by splitting the overlying host tissue into lobes which are at first reflexed and then deciduous, abundantly crystalliferous, with a few colorless hyphae 1.0 µm diam. adnate to the host tissue.

Subhymenium colorless, 5 µm thick, resting directly on host tissue. Paraphyses numerous, filiform, 1.0 µm broad, slightly enlarged at the tip, J+ blue. Asci cylindrical, 60-65 x 8 µm, the cap 2 µm thick, J-. Ascospores 8, obovate, with 3-4 transverse septa and 1 longitudinal septum, 13-18 x 4-5 µm.

On fern stalks, Java. *D. pulchella* is clearly not a lichen. It may be related to *Propolidium* or *Karstenia.*

SPECIMEN EXAMINED: ASIA: Java (BO, in petiolis emarcidis Filicis arboreae, Tijbodas, 2.III.1897, holotype of *Delpontia pulchella* [no material remains at GEN]).

(23). *(DIDYMASCINA)* Höhn., Ann. Mycol. 3: 331 (1905)

Lectotype species: *Amphisphaeria salicicola* Allesch., Ber. Bayer. Bot. Gesellsch. 1897: 13 (1897), designated by von Höhnel (1929)
= *Didymosphaeria* Fckl., Jahrb. Nassauischen Vereins Naturk. 23-24: 140 (1870)

According to von Höhnel (1909, 1929), *Didymascina* differs from typical *Didymosphaeria* (Pleosporales) only in having a poorly developed peridium.

(24). *DIPLOCRYPTIS* Clem., Gen Fungi 63, 174 (1909).

Holotype species: *Stictis foveolaris* Rehm., Ber. Naturh. Vereins Augsburg 26: 33 (1881)
= *Cryptodiscus* Corda

1-septate, rather than 3-septate spores is scarcely sufficient reason for founding a separate genus on *Stictis foveolaris*, which is a typical *Cryptodiscus*.

(25). *(DIPLONAEVIA)* Sacc., Syll. Fung. 8: 666 (1889)

Holotype species: *Diplonaevia caricum* (Auerswald ex Sacc.) Sacc., l.c.

According to B. Hein (personal communication) *Diplonaevia caricum* is a synonym of *Merostictis seriata* (Lib.) Défago. *Diplonaevia* may be an older name for *Merostictis*, which is considered (Défago, 1967; Korf, 1973) to be a member of the Pyrenopezizeae (Dermateaceae).

(26). *(DURELLA)* Tulasne & Tulasne, Sel. Fung. Carp. 3: 177 (1865)

Holotype species: *Peziza compressa* Pers., Disp. Meth. Fung. 34 (1797)
= *Xylogramma* Wallr.

The taxonomic disposition of *Durella* is complicated by confusion concerning the application of the name. The genus as treated by Dennis (1956) seems heterogeneous even when *Patinellaria* Karst. is recognized as separate. *D. commutata* Fckl. is a superficial, stalked fungus, not reported to have a *Cystotricha* imperfect stage.

As Dennis (l.c.) points out, Tulasne and Tulasne's concept of *D. compressa* (Pers.) Tul. & Tul. is based on two or possibly three different fungi. I can find no record of critical examination of material identified by Persoon as this species.

D. atrocyanea (Fr.) Höhn., which is perhaps identical with one of the fungi included in the protologue of *Durella*, is characterized by erumpent, sessile fruitbodies with a reduced margin of olive-brown hyphae widely spaced in a gel. The somewhat thick-walled asci lack an obvious apical apparatus, do not blue in iodine solutions, and are surrounded by numerous paraphyses which branch repeatedly near the apex to form an olivaceous epithecium. This common Ascomycete is perhaps out of place in the Leotiaceae (Helotiaceae), where it is currently classified, but does not seem to be Ostropalean.

Both Nannfeldt (1932) and Dennis (1956) suggest that *Durella* should be conserved against the earlier generic name *Xylogramma*, but this proposal has never been acted on by a botanical congress. In view of uncertainties concerning the type species of *Durella*, any action on such proposals would be premature. Considering the confused concept of *Durella* in the literature, I personally favor retention of *Xylogramma*.

SPECIMENS EXAMINED: EUROPE: Sweden (FH, Fries, Scleromycetes Sueciae 278, isotype of *Stictis atrocyanea* Fr.). NORTH AMERICA: USA (Herb. Sherwood 1982, New York).

(27). *(EUPROPOLELLA)* Höhn., Ann. Mycol. 15: 311 (1917)

Holotype species: *Sphaeropezia vaccinii* Rehm, Hedwigia 2: 114 (1882)
= *Naeviella* (Rehm) Clements

The taxonomy of *Eupropolella* has been reviewed by Müller (1957) and Défago (1967). Korf (1973) assigns the genus to the Naevioideae (Dermateaceae); the genus is certainly not Stictidaceous in the modern sense. *Naeviella* (q.v.) may be an older name for the genus.

(28). *(EUPROPOLIS)* de Not., Comment. Soc. Crittog. Ital. 1: 364 (1864).

Holotype species: *Eupropolis guthnickiana* de Not., l.c.
= *Phaeotrema* Müll. Arg., Mém. Soc. Phys. Hist. Nat. Genève 29: 10 (1887)
= *Janseella* P. Henn. & Nym.

I have received no answers to my inquiries for the type specimen and have been unable to locate any reliably identified material of *E. guthnickiana*, which occurred on bark in Puerto Rico and was described as having 3-septate brown spores, usually fewer than 8/ascus, and fruitbodies which resembled those of *Propolis* (Fr.) Fr. The description strongly suggests that this is a lichen in the genus *Phaeotrema* (Thelotremataceae), as was indirectly suggested by von Höhnel (see notes under *Janseella*, below). If examination of the type specimen proves this to be true, this becomes an older name for *Phaeotrema*, which, although conserved against *Asteristion* Leighton (1870) is not conserved against *Eupropolis*.

(29). *(FLAMINIA)* Sacc. & Sydow, Syll. Fung. 16: 777 (1902)

Holotype species: *Lindauella amylospora* Rehm, Hedwigia 11: 212 (1900)

The type specimen of *L. amylospora* contains several fungi. The one most closely fitting Rehm's description is hypophyllous in effuse, discolored spots occupying approximately half the leaf surface. The spots are dotted with regular depressions which are not present on healthy portions of the leaves. The depressions are approximately 200 μm broad. Most appear empty, but some contain a white powdery substance consisting of thin-walled, colorless, minutely punctulate spores with 5 indistinct pores in cross section, enclosed in a rather delicate, fugaceous peridium of angular cells, these also with punctulate markings. Host cells beneath the depressions contain numerous J+ purplish globules of the dimensions ascribed to the spores by Rehm. The fruitbodies seem to be the aecia of Uredinales.

SPECIMENS EXAMINED: SOUTH AMERICA: Brazil (S, Pijaca, on *Xanthoxylon*, Rio de Janero, Ule 2259, 1/1896, holotype of *Lindauella amylospora*).

(30). *(HABROSTICTIS)* Fuckel, Jahrb. Nassauischen Vereins Naturk. 23-24: 249 (1870)

Holotype species: *Habrostictis rubra* Fckl., l.c.

Habrostictis is assigned, with some reservations, to the Peziculoideae (Dermateaceae) by Dennis (1968).

(31). *(HYSTEROPEZIZELLA)* Höhn., Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Kl., Abt. 1, 126: 311 (1917)

Holotype species: *Micropeziza subvelata* Rehm, Ber. Naturh. Vereins Augsberg 26: 102 (1881)

Hysteropezizella was correctly assumed to be Dermateaceous by von Höhnel (l.c.).

(32). *(HYSTEROSTEGIELLA)* Höhn., l.c.: 313

Holotype species: *Stictis fenestrata* Desm., Ann. Sci. Nat. Bot. sér. 3, 16: 321 (1851)

Hysterostegiella was included by Clements and Shear (1931) in the Stictidaceae as a synonym of *Stegia*. Von Höhnel correctly assigned the genus (which is not a synonym of *Stegia*, q.v.) to the Dermateaceae. It is discussed by Défago (1967).

(33). *(IRYDYONIA)* Raciborski, Par. Alg. Pilze Java's 3: 20 (1900)

Holotype species: *Irydyonia filicis* Raciborski, l.c.

The type species is an immersed fungus which opens by a longitudinal slit, has fusoid spores with 1-2 basal cilia, and causes leaf spots on ferns. Raciborski considered the genus to be closely related to *Sphaeropezia*. It is unlikely that the fungus is Ostropalean, but only examination of the type specimen will reveal the true relationships of the genus.

(34). *(JANSEELLA)* P. Henn. & E. Nym., Monsunia 1: 171 (1900)

Holotype species: *Eupropolis asteriscus* P. Henn. &
E. Nym., l.c. p. 29.
= *Eupropolis* de Not.
= *Phaeotrema* Müll. Arg.

Von Höhnel (1911) synonymized *Janseella* and *Eupropolis*, which he regarded as Stictidaceous. He had not seen any specimens of *Eupropolis*. The isotype of *Janseella asteriscus* (P. Henn. & Nym.) P. Henn. & Nym. is a corticolous lichen in the genus *Phaeotrema* (Thelotremataceae).

Hennings and Nyman (l.c., p. 29) mention *'Jansella'* in connection with *E. asteriscus*, but do not accept the genus there. The orthography of the name preferred in the literature is the one accompanying the first valid publication. Hennings and Nyman give no etymology, but it seems probable that the name derives from Janse-ella, after J. M. Janse, author of a contemporary work on tropical phytopathology.

SPECIMEN EXAMINED: ASIA: Java (FH-Höhnel 4629, on *Flacourtia*, Buitenzorg, II.1898, Nyman, isotype of *Eupropolis asteriscus*).

(35). *(KARSTENIA)* Fr. in Karst., Acta Soc. Fauna Fl. Fenn. 2(6): 166 (1885)

Holotype species: *Propolis sorbina* Karst., Fungi
Fennici 839 (1869)
≡ *Chailletia* Karst.

Apothecia at first immersed, intracortical, more or less lenticular in cross section, raising the substrate into small pustules and finally rupturing it to form a margin of irregular teeth, not becoming erumpent, colorless, fleshy. Covering layer well-developed, non-crystalliferous, consisting of short-celled, vertically-oriented hyphae ending in a fringe of hairlike projections; covering layer continuous with the base of the conceptacle, which is also colorless and distinct from the subhymenium. Paraphyses numerous, filiform, J+ or J-. Asci short-stalked, clavate, uniformly thin-walled, lacking any defined apical apparatus. Ascospores colorless, thin-walled, transversely multiseptate.

On bark, fern rachides, and coarse monocotyledonous leaves; originally described from Europe but apparently more common in the tropics. The taxonomic position of *Karstenia* is questionable. In its fleshy texture, the construction of the upper part of the covering layer, and its growth habit it resembles immersed members of the Pyrenopezizeae, but the asci and diffuse blueing of the hymenial gel are quite out of place in that group. The margin is most easily interpreted as a lenticular discostromatic structure characteristic of the Phacidiales. Although remote from *Phacidium* and *Hypoderma*, *Karstenia* may be related to *Melittosporiella* or *Propolidium*, genera which seem to share characteristics with both the Phacidiales and Ostropales.

The concept of *Phragmonaevia*, which is a possible synonym of *Karstenia* and a more familiar name, is too confused to warrant proposing conservation of *Phragmonaevia* over *Karstenia*.

The four species discussed below are characteristic of the genus. In addition to *Karstenia corticoides*, there are several apparently undescribed species which occur in tropical America.

(1). *KARSTENIA SORBINA* (Karst.) Karst., Acta Soc. Fauna Fl. Fenn. 2(6): 166 (1885)

≡ *Propolis sorbina* Karst.
≡ *Chailletia sorbina* (Karst.) Karst., Bidrag Kännedom Finlands Natur Folk 9: 241 (1871).

Figure 12, a, b

Apothecia at first immersed, raising the substrate into small pustules and then opening irregularly by teeth, 0.5-1.0 mm diam., colorless. Covering layer adnate to the ruptured substrate, 75-100 µm thick, of vertically-oriented short-celled hyphae 1.5-3.5 µm diam., ending in a fringe of cells 15 x 1.5 µm. Lip cells absent. Subhymenium colorless, c. 20 µm thick, distinguished from the underlying conceptacle by its smaller cells and darker staining reaction in cotton blue. Asci uniformly thin-walled, short-stalked, lacking a defined apical apparatus, J-, 80-100 x 10-13 µm, 8-spored. Ascospores 38-62 x 3-4 µm, cylindrical with obtuse ends, barely tapered below, transversely multiseptate, the cells 3-4 µm long. Paraphyses colorless, filiform, 1.0 µm thick, not enlarged above.

On *Sorbus*, Finland. Apparently known only from the type specimen.

SPECIMEN EXAMINED: EUROPE: Finland (FH, Fungi Fennici 839, on *Sorbus*, isotype of *Propolis sorbina*).

(2). KARSTENIA IDAEI (Fuckel) Sherwood, comb. nov.

≡ *Schizoxylon idaei* Fuckel, Jahrb. Nassauischen Vereins Naturk. 23-24: 251 (1870).

Figure 12, c, d

Apothecia immersed, 0.3-0.5 mm diam., raising the substrate into small pustules and then splitting it irregularly, forming several teeth which are reflexed when the apothecium is rehydrated. The covering layer, which is colorless, adnate to the substrate, c. 60 µm thick, composed of vertically-oriented, short-celled hyphae 2.5-3 (-4) µm diam., and ends in a fringe of cells 10 x 2.5 µm, continues beneath the subhymenium as a layer c. 20 µm thick. Subhymenium separated from the lower conceptacle by a band of disintegrating host tissue. Paraphyses numerous, filiform, J-, 1.0 µm diam., not apically enlarged or branched. Asci short-stalked, uniformly thin-walled, lacking a defined apical apparatus, J-, 80-100 x 10-14 µm, 8-spored. Ascospores 40-60 x 3-4 µm, cylindrical, barely tapered basally, transversely multiseptate, the cells 4-5 µm long.

On canes of *Rubus idaeus*. This species is obviously no *Schizoxylon*, and differs from *K. sorbina* chiefly in having a thinner covering layer with larger cells.

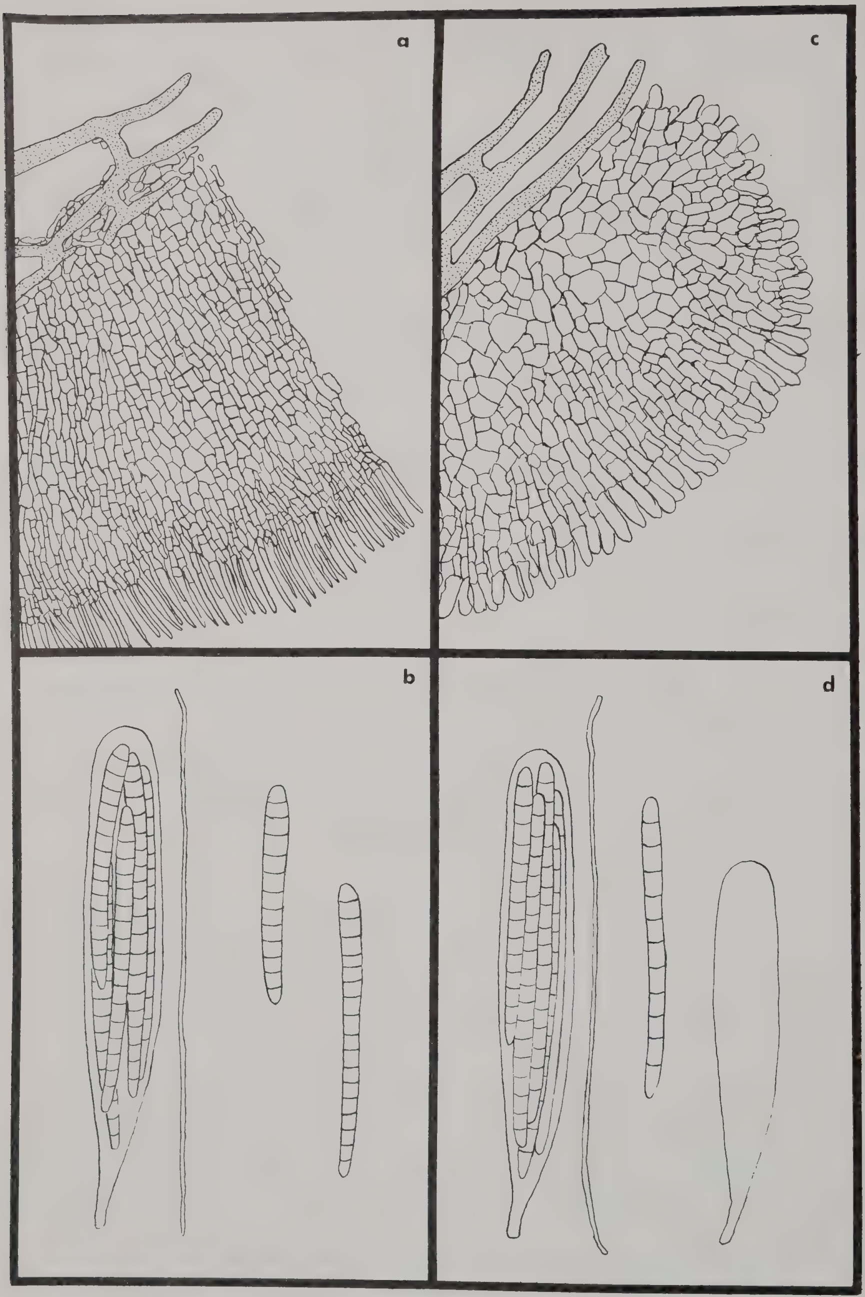

FIGURE 12. a-b. *Karstenia sorbina*. a. Detail of covering layer, x750. b. Ascus, paraphysis, and spores, x750. Drawn from FH-Fungi Fennici 839. c-d. *Karstenia idaei*. c. Detail of covering layer, x750. d. Asci, paraphysis, and spores, x750. Drawn from the holotype.

SPECIMEN EXAMINED: EUROPE: Austria? (G, sine coll., ex herb. Fuckel, presumed holotype of *Schizoxylon idaei*).

(3). KARSTENIA CORTICOIDES (Pat.) Sherwood, comb. nov.

≡ *Stictis corticoides* Pat., Bull. Soc. Mycol. France 11: 220 (1895)

Apothecia immersed, opening by splitting the substrate irregularly to expose the ochraceous disc, 2-6 mm diam. Covering layer colorless, 20-30 µm thick, of vertically-oriented hyphae 2-4 µm diam. prolonged into a distinct basal fringe. Asci 125-150 x 10 µm, uniformly thin-walled, J-, lacking an obvious apical apparatus, 8-spored. Spores 115-125 x 2.5 µm, cylindric-filiform, barely tapered, septate, the cells 3-5 µm long. Paraphyses numerous, filiform, apically enlarged to a spathulate tip 2.5 µm broad, but not regularly bifurcate as was implied by Patouillard.

On wood and bark, tropical America.

SPECIMENS EXAMINED: NORTH AMERICA: Mexico (CUP-ME-30, Michoacan). SOUTH AMERICA: Ecuador (FH, Lagerheim, Juillet 1892, holotype of *Stictis corticoides*) .

(4). KARSTENIA LONICERAE (Velenovský) Sherwood, comb. nov.

≡ *Propolidium lonicerae* Velenovský, Monogr. Discom. Bohem. 1: 50 (1934); 2: pl. 2, f. 20 (1934).

Figure 13

Apothecia at first immersed, raising the substrate into small pusules and then splitting the overlying substrate into irregular teeth, 0.3-0.7 mm broad, the disc pale ochraceous. Covering layer 50 µm thick at the broadest point, adnate to the ruptured substrate, of vertically-oriented colorless hyphae 2-3 µm diam., these prolonged below into a fringe of hyphae 1.5 x 5-7 µm. Asci broadly clavate, short-stalked, J-, 70-95 x 8-9 µm, thin-walled, lacking any defined apical apparatus, 8-spored. Paraphyses filiform, 1 µm thick, enlarged to 1.5-2 µm above, not branched, J-, forming an indistinct epithecium. Spores 25-35 x 3-4.5 µm, minutely punctate, basally attenuate, (3-)5-9 septate.

On *Lonicera* and *Cornus*, Bohemia.

SPECIMEN EXAMINED: EUROPE: Czechoslovakia (PRM 152901, on *Lonicera*, Mnihovice, isotype of *Propolidium lonicerae*).

(5). *(KARSTENIA SUBLILACINA)* Ell. & Ev., Bull. Lab. Nat. Hist. Iowa State Univ. 4: 69 (1896)

≡ *Ocellularia sublilacina* (Ell. & Ev.) Zahlbr., Cat. Lich. Univ. 2: 601 (1924)

Judging from a portion of the type (CUP-D-7588) which I examined, Zahlbruckner's transfer to *Ocellularia* is correct.

(36). *(LAQUEARIA)* Fries, Summa Veg. Scand., sect. post. 366 (1849)

Holotype species: *Stictis sphaeralis* Fr., Syst. mycol. 2: 194 (1822)

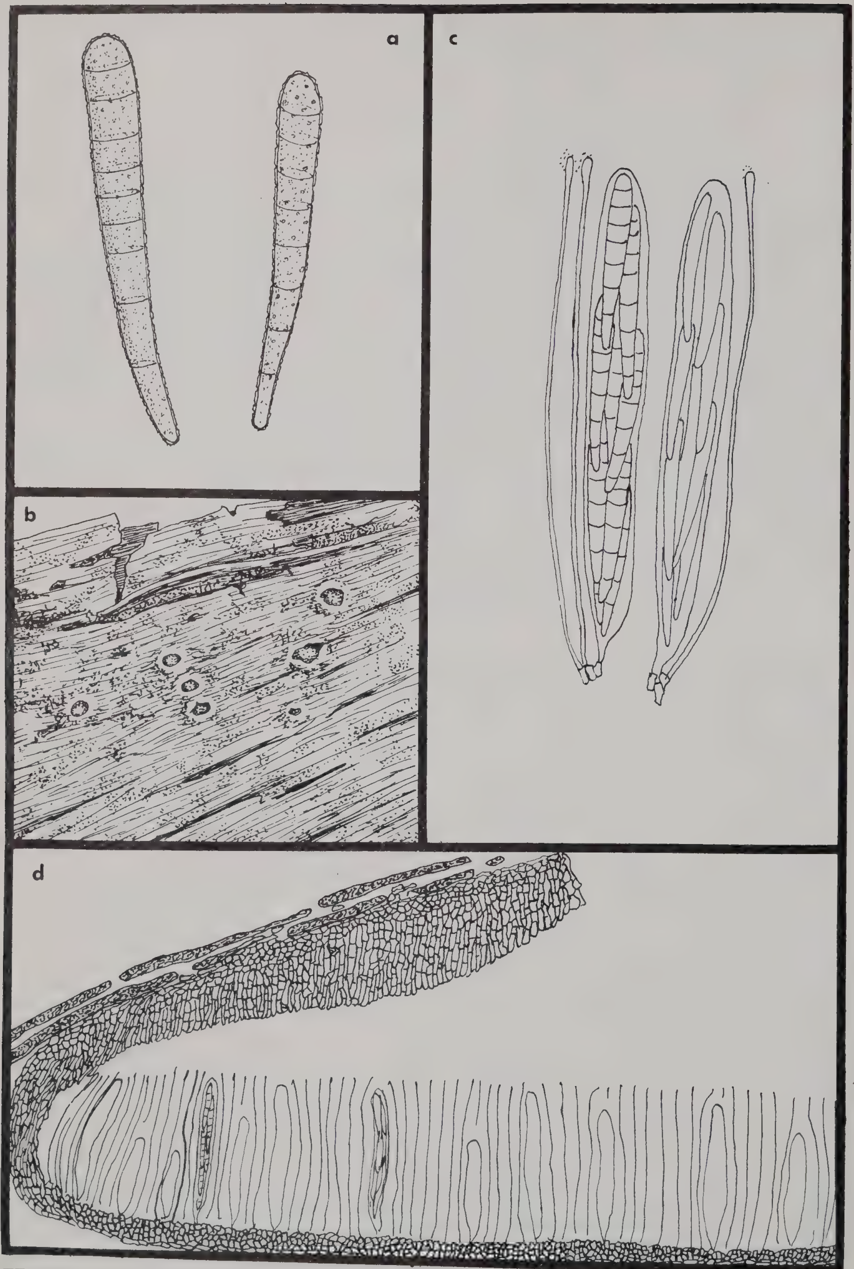

FIGURE 13. *Karstenia lonicerae*. a. Ascospores, x1500. b. Habit sketch, x 7.5. c. Asci, paraphyses, and ascospores, x750. d. Cross section of apothecium, x300. Drawn from PRM 152901.

Laquearia appears as one of three genera in the Ostropaceae as conceived by Rehm (1887-96), but is assigned to the Phacidiaceae by Dennis (1968). According to Massee (manuscript notes with the specimen from Fungi Rhenani at NY) and Dennis (1968), *L. sphaeralis* has asci without a prominent apical apparatus, and 8 unicellular colorless spores. Both base their descriptions on Fuckel's Fungi Rhenani 2066; I could find no asci or spores in the specimen at NY. The species occurs immersed in branches of *Fraxinus* and opens by a black punctiform ostiole in a crystalline disc. Fuckel's material may well be Pyrenomycetous. It does not seem to belong in either the Phacidiaceae or the Ostropales.

(37). *(LASIOSTICTIS)* (Sacc. & Berlese) Sacc., Syll. Fung. 8: 696 (1889).

Holotype species: *Stictis (Lasiostictis) conigena* Sacc. & Berl., Atti Reale Ist. Veneto Sci., Lett., Arti VI 3: 734 (1885).

Lasiostictis is a typical member of the Phacidiaceae. For a discussion of the genus, see Sherwood (1974).

(38). *(LEPTOCREA)* Sydow, Ann. Mycol. 14: 87 (1916)

Holotype species: *Leptocrea orbiculata* Sydow, l.c.
= *Polystigma* DC, Fl. Franc. 5: 164 (1815)

Von Arx and Müller (1954) transfer the type species to *Polystigma* (Sphaeriales). *Leptocrea* appears as a questionable genus of Stictidaceae in Clements and Shear (1931).

(39). *LICHENOPSIS* Schw., Trans. Amer. Philos. Soc. n.s. 4: 308 (1832).

Holotype species: *Lichenopsis sphaeroboloidea* Schw., l.c.
≡ STICTIS sect. LICHENOPSIS (Schw.) Sherwood, comb. nov.

The characters of the section, and of *Stictis sphaeroboloidea* and its allies, are discussed under *Stictis*, below.

(40). LILLICOA Sherwood, gen. nov.

Apothecia hypophylla, sessilia, parva, cylindrica vel turbinata. Subhymenium achromum, ex cellulis parvis, angularibus, parietibus macris praeditis constans. Margo achromus, ex hyphis gracilibus, septatis, laxe intertextis, cum crystallis abundantibus mixtis constans, siccus ab hymenio se non abrumpens. Paraphyses numerosae, graciles, achromae, simplices vel ramosae. Asci cylindrici, apice incrassati, poro in iodo non caerulescente. Ascosporae filiformes, transversae septatae.

Holotypus: *Ophionectria palicoureae* Seaver & Whetzel.

Etymology: After Sandra White, née Lillico, friend and botanist.

Apothecia hypophyllous, small, sessile, cylindrical to turbinate, with a white-pruinose margin and deeply urceolate

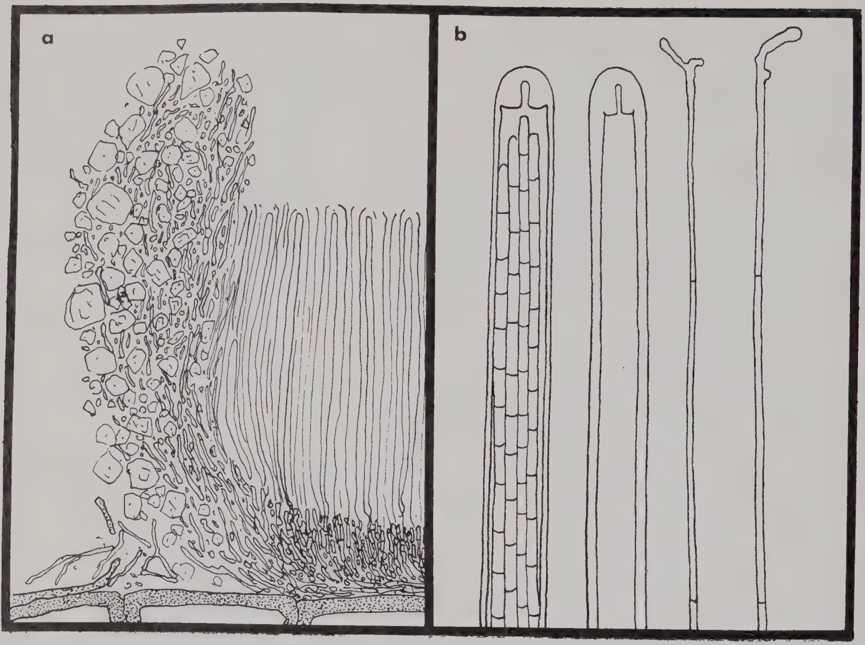

FIGURE 14. *Lillicoa palicoureae*. a. Cross section of apothecium, x375. b. Detail of ascus and paraphysis apices, x1500. Drawn from CUP 14743.

disc. Subhymenium colorless, of small, angular, thin-walled cells. Margin devoid of differentiation into layers, not splitting away from the hymenium when dry, of slender, colorless interwoven hyphae intermingled with numerous crystals. Paraphyses numerous, filiform, simple or branched, J-. Ascospores colorless, filiform, transversely multiseptate. Asci cylindrical, with thin lateral walls and a distinct apical cap.

Superficial on living leaves, tropical America. *Lillicoa* differs from *Stictis* in its completely superficial habit and lack of periphysoids, and from *Schizoxylon* in being a much tinier, superficial fungus occurring on living leaves, and in having spores which do not disarticulate at the septa.

Dennis (1954), in a discussion of tropical discomycetes, illustrates *Erinella bicolor* Pat.& Lagerheim, which is almost certainly congeneric and possibly conspecific. At the time Dennis thought that *E. bicolor* belonged to an as yet undescribed genus of Ostropales, but declined to found a genus on Patouillard's scanty type specimen. While admitting that *E. bicolor* may be an older name for *O. palicoureae*, I choose the latter as my type species, since it is represented by abundant material in the CUP herbarium. Rossman (1975) synonymizes the two species, without, however, examining the type of *E. bicolor*.

(1). LILLICOA PALICOUREAE (Seaver & Whetzel) Sherwood, comb. nov.

≡ *Ophionectria palicoureae* Seaver & Whetzel, Sci. Survey Porto Rico and Virgin Islands 8(1): 45 (1926)

Figure 14

Apothecia hypophyllous, scattered on and adjacent to the midrib of leaves of *Palicourea?* sp. (Rubiaceae), sessile, superficial or at most initially subcuticular (early stages not seen), cylindrical, 0.2-0.3 mm diam., 0.2-0.3 mm tall, cylindrical, with a white-pruinose margin and deeply urceolate pale orange disc. Subhymenium c. 75 μm thick, of closely septate colorless hyphae 1.0 μm diam., J-. Margin c. 70 μm thick, obscurely 2-layered, the outer layer predominantly crystalline, the inner layer of interwoven colorless hyphae 1.0-1.5 μm diam., vertically-oriented, not markedly gelatinous. Periphysoids absent. Paraphyses numerous, filiform, 1.0 μm broad, sometimes forked near the tip and weakly circinate, J-. Asci 110-120 x 5(-6) μm, the cap 3.0 μm thick, pierced by a narrow pore. Ascospores 8, 90-100 x 1.0-1.5 μm, septate, the cells 4-6 μm long.

On living leaves, Puerto Rico, West Indies. Dennis (1954) states that the ascospores of *Erinella bicolor* measure 80 x 1.0-1.5 μm, draws the paraphyses as being forked near the middle, and illustrates turbinate, rather than cylindrical ascocarps. The two species may possibly be distinct.

Leaves colonized by *Lillicoa palicoureae* show no evidence of being diseased and the fungus seems neither to be associated with other fungi nor to be growing on a lichen thallus. Its relationship to the host plant remains a mystery.

SPECIMENS EXAMINED: NORTH AMERICA: Puerto Rico (CUP-14743, on *Palicourea?* sp., woods, Guaynabo, H.H. Whetzel, R.A. Toro, F.D. Kern, 25.VI.1924, isotype of *Ophionectria palicoureae;* CUP-PR-2682, *ibid.*)

(41). *(LINDAUELLA)* Rehm, Hedwigia 39: 82 (1900)

Holotype species: *Lindauella pyrenocarpoidea* Rehm, l.c.

L. pyrenocarpoidea, which was originally described as having fruitbodies which were initially closed, but opened by a broad pore to expose the disc, is a pyrenomycete in the Polystigmataceae. The solitary perithecia are completely immersed and occupy the entire thickness of the leaf. There does not appear to be any stroma present. The perithecial wall is approximately 20 μm thick, brown on the outside and colorless within, and opens by an indistinct pore. The cylindrical, apparently unitunicate asci are J- and lack an obvious apical apparatus. The ascospores are spherical, colorless, unornamented, and uniseriate. Numerous true paraphyses are present.

On living leaves of grasses. *Lindauella* seems near *Glomerella*, but differs in having spherical spores. It may be an acceptable genus of the Polystigmataceae.

SPECIMEN EXAMINED: SOUTH AMERICA: Brazil (S, auf Gras *Ophiodotis*, Prov.

SEE ERRATA p.17

Santa Catharina, São Francisco, Ule, April 1884, holotype of *Lindauella pyrenocarpoidea*)

(42). *(MELANOSTROMA)* Corda in Sturm, Flora Deutschlands 3(2): 129 (1829)

Holotype species: *Melanostroma fusarioides* Corda, l.c.

Corda (1837) assigned *M. fusarioides* to the Caeomaceae (Coniomycetes)(a mixture of Coelomycetes and Uredinales), listing *Stictis pupula* Fr. as a synonym. The original description and accompanying plate show an immersed, dark-colored fungus with a broad white margin. Von Höhnel (1923) interpreted it as Stictidaceous.

The only specimen of *M. fusarioides* in Corda's herbar-uium was collected at Reichenberg and does not seem to be the type. It contains a pycnidial fungus consisting of groups of 3-5 pycnidia immersed in a predominantly hyphal, colorless stroma. The pycnidia become confluent at the neck and collectively erumpent through the bark of the host. Individual pycnidia are 0.2-0.3 mm diam., with a wall of closely-packed hyphae which are colorless at the base and brown near the apex. The cavity is lined with a layer of closely-packed, sessile phialides 8.0 x 1.5 µm, with a minute collarette. The colorless, non-septate phialoconidia measure 11-14 x 1.5-2.0 µm. These become heaped up around the pycnidial opening, forming the white border which mimics the crystalline layer of *Stictis*.

According to Nag Raj *(personal communication)* the spores spores have a basal gelatinous appendage, and *Melanostroma* falls into synonymy with *Ceuthospora* Greville (1827).

SPECIMEN EXAMINED: EUROPE: Czechoslovakia (PRM 155577, Reichenberg, authentic collection of *Melanostroma fusarioides*).

(43). *MELITTOSPORIELLA* Höhn., Ann. Mycol. 16: 211 (1918)

Holotype species: *Melittosporiella pulchella* Höhn., l.c.

Apothecia at first completely immersed, opening by splitting the overlying substrate irregularly into teeth, orbicular to somewhat irregular in outline, middle-sized. Margin well-developed, of vertically-oriented, non-carbonized hyphae ending in a fringe of hairlike projections. Paraphyses numerous, filiform, J-. Asci cylindrical, somewhat thick-walled when young, with an obscure apical cap. Ascospores colorless, thin-walled, transversely septate.

According to von Höhnel, *Melittosporiella* resembled *Melittosporium* but differed in having transversely septate spores. *Melittosporium* (q.v.), however, lacks true paraphyses and is ascolocular; *Melittosporiella* appears to have true paraphyses and to be more closely related to *Karstenia* and *Propolidium*. The genus is accepted as Ostropalean with some reservations, because of a possible connection to *Cryptodiscus*.

(1). MELITTOSPORIELLA PULCHELLA Höhn., Ann. Mycol. 16: 211 (1918)

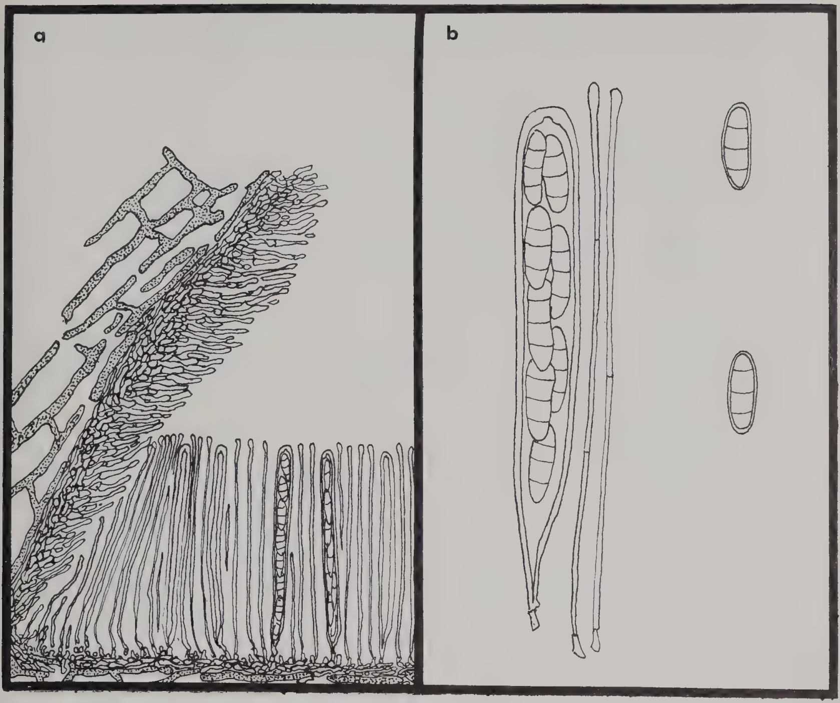

FIGURE 15. *Melittosporiella pulchella*. a. Cross section of margin, x375. b. Ascus, paraphyses, and spores, x750. Drawn from Rehm, Ascomyceten 1976 (CUP-D-12032).

Figure 15

Apothecia at first immersed in decorticate wood, opening by splitting the overlying wood into lobes, 1-2 mm broad, irregular in outline, with the aspect of a dark green *Propolomyces*. Margin splitting away from the hymenium when dry, non-crystalline, pale brown, 20 µm thick, of interwoven hyphae 2.0 µm diam., the inner face a compact layer of periphysoids 8-10 x 2.0 µm, cemented in a gel. True paraphyses numerous, imbedded in a J- gelatinous matrix, 1.0 µm broad below, enlarged to 2.0 µm at the tip which is imbedded in an olivaceous amorphous material. Subhymenium J-, 10 µm thick, of short-celled colorless hyphae 2.0 µm diam. Asci 75-80 x 12 µm, cylindrical, thick-walled, appearing bitunicate but apparently without a separable inner wall, 8-spored. Spores irregularly biseriate, thin-walled, colorless, 3-septate, not constricted at the septa, cylindric-fusiform to suballantoid, 15-18 x 4.5-5.0 µm.

On wood, Tirol.

SPECIMEN EXAMINED: EUROPE: Austria (CUP-D-12032 [Rehm Ascomyceten 1976], on *Olea*, S. Tirol, 5.1912, Dittrich-Walkhoff, originally distributed as *Cryptodiscus atrovirens*, isotype of *Melittosporiella pulchella*).

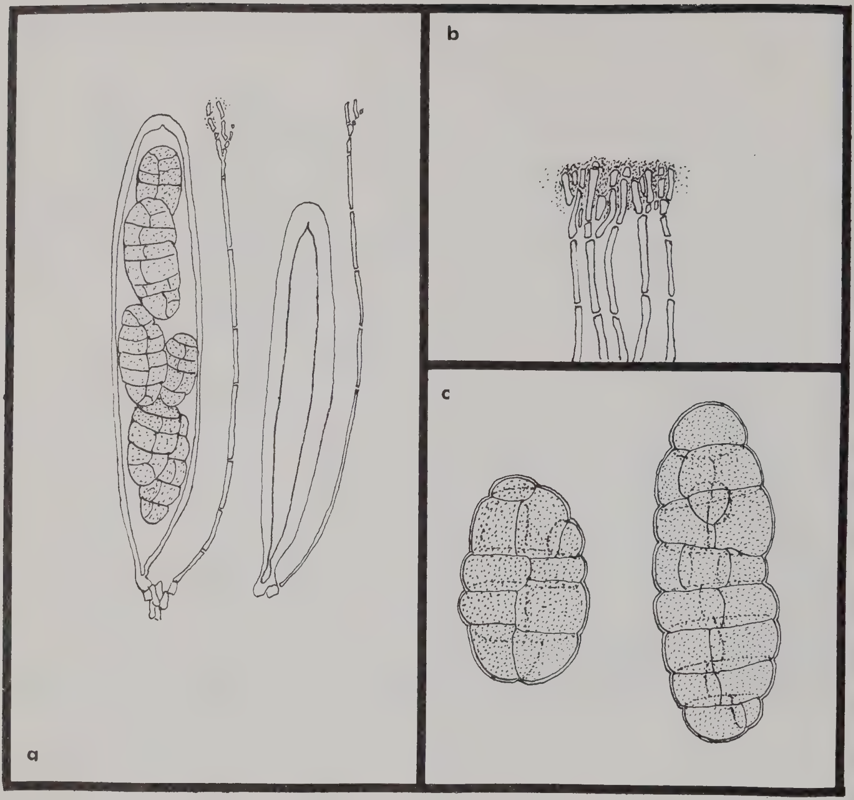

FIGURE 16. *Melittosporium versicolor*. a. Asci, Paraphyses, and spores, x 750. b. Detail of paraphysis apices, x1500. c. Ascospores, x1500. Drawn from FH-Fries, Scleromycetes Sueciae 276.

(44). *(MELITTOSPORIUM)* Corda, Icones Fungorum 2: 23 (1838)

Holotype species: *Stictis versicolor "c"* Fr., Syst. Mycol. 2(1): 198 (1822)
= *Pleiostictis* Rehm

(1). *MELITTOSPORIUM VERSICOLOR* (Fr.) Corda, l.c.
≡ *Stictis versicolor "c"* Fr., l.c.
≡ *Propolis versicolor* (Fr.) Fr., Summa veg. scand. sect. post. 372 (1849)

Figure 16

M. versicolor is characterized by immersed, emarginate, hysterothecial green fruitbodies, dark brown muriform spores, bitunicate asci, and pseudoparaphyses which branch and anastomose at the apex to form a thick epithecium. *Melittosporium* would appear to be a good genus, but should be transferred to the Hysteriales. For reasons discussed in a separate paper (Sherwood, 1977), this is the correct application of the name *Stictis versicolor*.

SPECIMEN EXAMINED: EUROPE: Sweden (FH-Höhnel, slides of Fries Sclerom. Sueciae 276, isotype of *Stictis versicolor "c"*)

(45). *(MEROSTICTIS)* Clements, Gen. Fungi 64, 174 (1909)

Holotype species: *Stictis emergens* Karst., Not. Sällsk. Fauna Fl. Fenn. Förh. 11: 254 (1871)
= *Diplonaevia* Sacc., according to B. Hein *(personal communication)*

Assigned to the Pyrenopezizeae (Dermateaceae) by Nannfeldt (1932), a position approved by the majority of discosystematists, *Merostictis* was reviewed by Défago (1967).

(46). *(MOUTONIELLA)* Penz. & Sacc., Malpighia 15: 221 (1901)

Holotype species: *Mountoniella polita* Penz. & Sacc., l.c.

Von Hohnel's (1912) assignment of *Mountoniella* to the Phacidiales appears to be correct. The orbicular fruitbodies occur on leaves of *Eletteria* (Zingiberaceae) and open by splitting the non-stromatized epidermis into 3-4 lobes which are soon deciduous. In cross section the fruitbody consists of a well-developed basal stroma, a hymenium of pointed, uniformly thin-walled, J- asci containing 8, cylindrical, multiseptate spores, numerous paraphyses which are inflated at the tip and imbedded in a brown amorphous J- matrix, and a reduced excipulum of 3-4 layers of agglutinated hyphae resembling the paraphyses. The same type of excipulum is found in *Naemacyclus niveus*. As generic limits are currently conceived in the Phacidiales, *Moutoniella* should be considered a distinct genus of the Phacidiales, allied to *Naemacyclus* but differing in having inflated paraphyses. Petrak (1950b) separated *Neophacidium* from *Phacidium* on the same character.

SPECIMEN EXAMINED: ASIA: Java (FH-Höhnel 7879, labelled *Moutoniella* sp., Tijbodas, 1908 [not type material])

(47). *(MYCOGLAENA)* Höhn., Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Kl. Abt. 1, 118: 1211 (1909)

Holotype species: *Verrucaria subcoerulescens* Nyl., Flora 55: 362 (1872)
= *Polyblastiopsis* Zahlbr. in Engler & Prantl., Natürlichen Pflanzenfamilien 1(1): 65 (1907)

Poelt (1969) considers *Polyblastiopsis* to be dubiously lichenized, and the specimens I have seen would certainly confirm this. *V. subcoerulescens* is a pyrenomycete with obvious bitunicate asci. Von Höhnel (l.c.) assigned the genus to the Ostropaceae. Harris (1973) considers *Mycoglaena* to be distinct from *Polyblastiopsis*.

SPECIMENS EXAMINED: NORTH AMERICA: USA (Herb. Sherwood 14, Oregon, 22.VI. 1970; 202, Oregon, VII.1971)

(48). *(NAEMACYCLUS)* Fckl., Jahrb. Nassauischen Vereins Naturk. 27-28: 49 (1873)

Holotype species: *Propolis pinastri* Lacroix in Desm., Pl. Crypt. Exs. 2: 791 (1851) (= *Naemacyclus niveus* [Pers.] Sacc.)

The ascocarps of *N. niveus* are at first immersed, later opening by rupturing the host epidermis into two flaps which are soon deciduous. The apothecia have a reduced excipulum consisting of 2-3 layers of brown agglutinated hyphae not exceeding the apices of the paraphyses in length. The pointed, uniformly thin-walled, J- asci are surrounded by numerous paraphyses which branch near the apex, giving the hymenium a pruinose appearance. Nannfeldt (1932) dismissed the possibility that *Naemacyclus* was Ostropalean, but was uncertain of its relationships, other than it might be related to *Propolis* (Fr.) Fr. *Naemacyclus* was included by Korf (1962) in the Hemiphacidiaceae, a family of needle cast pathogens of conifers. I am unfamiliar with *Hemiphacidium*. The asci of *Naemacyclus* more closely resemble those of *Lophodermium* than they do those of *Rhabdocline* Sydow or *Fabrella* Kirschst., two representative genera of the Hemiphacidiaceae. The genus is closely allied to *Propolis* (Fr.) Corda (non *Propolis* [Fr.] Fr.), which is discussed in a separate paper (Sherwood, 1977).

SPECIMENS EXAMINED: AFRICA: Canary Islands (CUP-MM-124, 127, 146, 153, 487, all on needles of *Pinus*, Tenerife; MM-743, on *Pinus*, La Palma)

(49). *(NAEVIA)* Fr., Summa veg. scand., sect. post. 373 (1849)

Lectotype species: *Leptostroma scripta* Fr., Syst. mycol. 2(2): 598 (1823), designated by von Höhnel (1917a)
Neotype species: *Phacidium minutissimum* Auersw. in Rabenh., F. Eur. II: 228 (1860), designated by Nannfeldt (1932)

According to von Höhnel (1917a), *Naevia* Fr. 1849 is a later homonym of *Naevia* Fr., Lich. Exs. Sueciae 4 (1824) (= *Arthonia*). Von Höhnel considered *N. scripta* (Fr.) Fr. to be "verschollen" (utterly lost); he concluded that the name *Naevia* Fr. 1849 should be abandoned. Nannfeldt (1932) rejected Fries's concept of the genus and chose a neotype species from among Rehm's (1887-1896) taxa, none of which were included in the genus by Fries. Hein (1976) concluded that the generic name should be abandoned and proposed *Naevala* for *Naevia* sensu Rehm, a genus of immersed members of the Dermateaceae.

(50). *(NAEVIELLA)* (Rehm) Clements, Gen. Fungi 63, 174 (1909)

Lectotype species: *Naevia paradoxa* Rehm, Hedwigia 21: 58 (1882), selected by Clements, l.c.
≡ *Phragmonaevia* [sect.?] II. *Naeviella* Rehm in Rabenh., Krypt.-fl. ed. 2, 1(3): 164 (1888)
= *Eupropolella* Höhn.

The lectotype species is treated as either *Hysteropezizella paradoxa* (Rehm) Nannf. (1932) or *Eupropolella paradoxa* (Rehm) Défago (1967) in modern classifications. *Naeviella* is an older generic name than either *Hysteropezizella* or *Eupropolella*. There seems to be little doubt that the type species of *Naeviella* is Dermateaceous. Clements and Shear (1931) declare the type to be *Naeviella fuckelii* (Rehm) Clements & Shear, another species Rehm included in his subgenus.

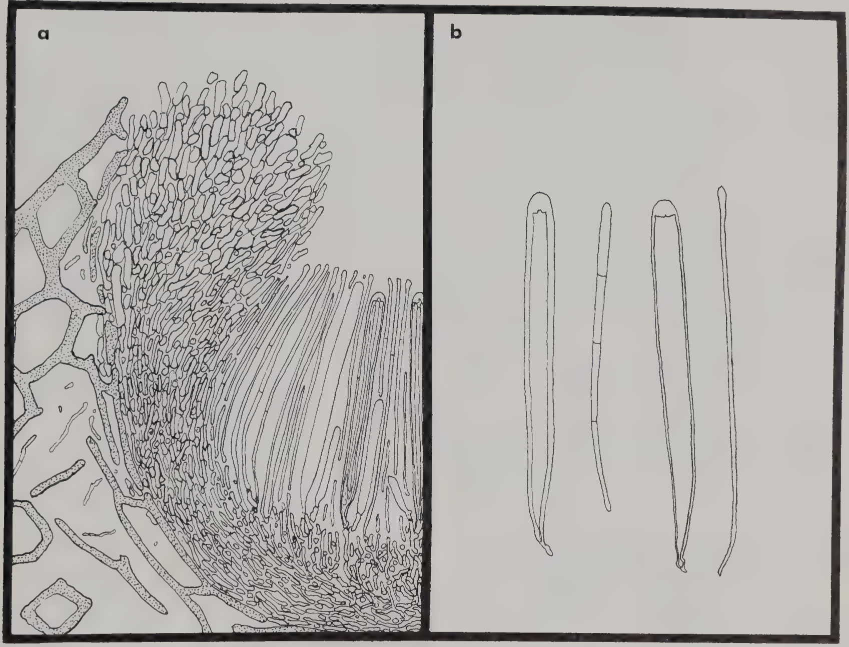

FIGURE 17. *Nanostictis peltigerae.* a. Cross section of apothecium, x375. b. Asci, paraphysis, and spore, x750. Drawn from prepared slides of the holotype made by M.S. Christiansen.

(51). *NANOSTICTIS* M. S. Christiansen, Bot. Tidskr. 51: 59 (1954)

Holotype species: *Nanostictis peltigerae* M. S. Christiansen, l.c.

Figure 17

Apothecia at first immersed, opening by a pore, not becoming erumpent, minute, colorless, with an entire, non-crystalline margin and a deeply-immersed disc which does not split away from the margin when dry. Margin devoid of differentiation into layers, consisting throughout of interwoven colorless hyphae. Paraphyses numerous, filiform, J-. Asci cylindrical, with thin lateral walls and a distinct apical cap, J-. Ascospores colorless, filiform, transversely multiseptate.

On lichens. *Nanostictis* is, as Christiansen (1954) demonstrated, easily distinguished from *Stictis* by marginal characters. The genus is less sharply delimited from *Cryptodiscus;* the two genera should perhaps be merged.

(1). *NANOSTICTIS PELTIGERAE* M. S. Christiansen

Figure 17

Apothecia epithallic or hypothallic; when epithallic, at first immersed beneath the cortex of the host, becoming erumpent; when hypothecllic, sessile on the hyphae of the ecorticate lower surface, 0.16-0.32 mm diam., colorless, the margin entire, not splitting away from the hymenium when dry. Margin, in cross section, 40-50 µm thick, of tightly-packed colorless hyphae 1.0 µm in diam., these inflated to 2-3 µm above. Crystals and periphysoids absent. Subhymenium colorless, J-, 5 µm thick, of narrow-diameter, short-celled hyphae, these resting on an extension of the margin 5-10 µm thick, Hymenium entirely J-. Asci thick-walled when young, 50-64 x 4.0-4.8 µm, the cap 2.5 µm thick, with an indistinct pore. Paraphyses numerous, filiform, simple, 1.0 µm thick, barely thickened at the apex, not forming an epithecium. Ascospores 8, 40-60 x 1-1.3 µm, tapering below, 3-septate, not sheathed or coiling.

On decaying thalli of *Peltigera polydactyla*, Denmark. The figure was drawn from one of Christiansen's prepared slides. The structure of the margin is somewhat more hyphal than was indicated in the original description.

SPECIMEN EXAMINED: EUROPE: Denmark (C, M. S. Christiansen 5400, on *Peltigera*, holotype of *Nanostictis peltigerae*)

(52). *(OCELLARIA)* (Tulasne & Tulasne) Karst., Bidrag. Kännedom Finlands Natur Folk 19: 21 (1871)

Holotype species: *Peziza ocellata* Pers., Syn. Meth. Fung. 667 (1801)
≡ *Stictis* subgen. *Ocellaria* Tulasne & Tulasne, Sel. Fung. Carp. 3: 129 (1865)

Ocellaria ocellata (Pers.) Schroet. was placed in the Peziculoideae (Dermateaceae) by Nannfeldt (1932), Dennis (1968), and Korf (1973).

(53). *ODONTOTREMA* Nyl., Not. Sällsk. Fauna Fl. Fenn. Förh. 8: 249, tab. 1 (1861)

Holotype species: *Odontotrema minus* Nyl., l.c.

Apothecia at first immersed, opening by a pore and at length becoming somewhat erumpent, the margin thick, black, inrolled when dry, entire, the disc deeply immersed, not splitting away from the margin when dry. Subhymenium thick, black. Margin, in cross section, devoid of differentiation into layers, of coarse, brown, interwoven hyphae lying parallel to the surface of the ascocarp. Paraphyses numerous, filiform, embedded in a J+ gelatinous matrix. Asci cylindrical, thick-walled when young, with a prominent apical cap, J-. Spores colorless, transversely septate.

On wood. Considered, albeit dubiously, to be a lichen by Nylander, *Odontotrema* was assigned to the Phacidiales by von Höhnel (1917b), to the Stictidaceae by Saccardo (1889), to the Tryblidiaceae by Clements and Shear (1931), and to the

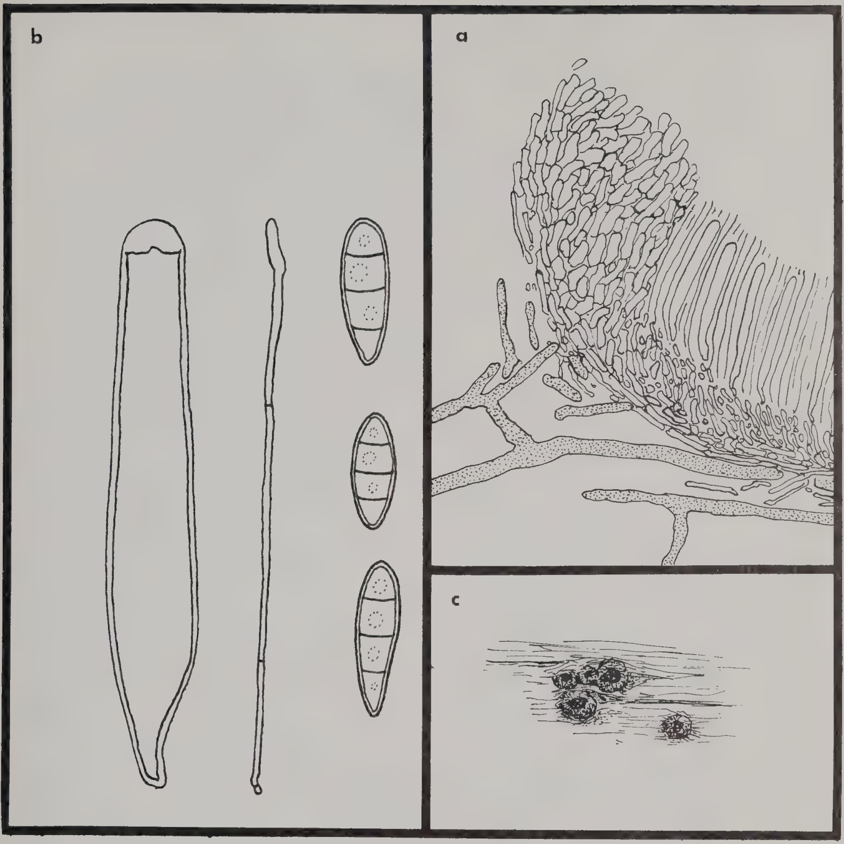

FIGURE 18. *Odontotrema minus*. a. Ascus, paraphysis, and spores, x1500. b. Cross section of margin, x375. c. Habit sketch, x10. Drawn from Rabenhorst, Fungi Europaei 2647 (CUP-D-7164)

Helotiales (family uncertain) by Nannfeldt (1932). The immersed habit, simple structure of the margin, capitate asci, and J+ reaction of the hymenial gel all suggest a relationship with *Cryptodiscus*.

(1). ODONTOTREMA MINUS Nyl.

Figure 18

Apothecia at first immersed in weathered decorticated wood, opening by a pore, becoming erumpent and at length appearing nearly superficial, 0.3-0.5 mm diam., the margin black, rough, striate, inrolled when dry, the disc deeply immersed, black, not splitting away from the margin.

Margin, in cross section, c. 60-75 µm thick, pseudoparenchymatous below, brown, becoming hyphal toward the margin, the cells 2.0-2.5 µm diam., the outermost layer thick-walled, stromatized. Subhymenium brown. Paraphyses numerous, filiform, colorless, 1.0 µm broad, enlarged to 1.5 µm at the apex, J+ faintly blue. Asci 45-50 x 6(-10) µm, thick-walled when young, the apical cap 2-2.5 µm thick. Ascospores 8, 10-14 x 4-4.5 µm, 3-septate, not constricted at the septa.

On bleached wood, Finland.

SPECIMEN EXAMINED: EUROPE: Finland (CUP-D-7164, Rabenhorst-Winter F. Eur. 2647, Mustiala, Karsten X.1881).

(54). *OSTROPA* Fr., Syst. Orbis Vegetabilis 109 (1825)

Lectotype species: *Hysterium cinereum* Pers., Syn. Meth. Fung. 99 (1801), designated by Saccardo (1883)

Fruitbodies at first immersed in plant tissue, consisting of a dark pseudostromatic mass with numerous crystalline inclusions, soon becoming erumpent by elongation of the paraphyses. Fruitbodies orbicular in cross section, erumpent, tough, long-persistent, closed when dry, opening by a prominent transverse slit. Wall of interwoven, closely-packed hyphae, much thickened above to form two massive lips containing numerous crystalline inclusions and lined on their inner faces by sparse periphysoids. Since the periphysoids do not extend the entire length of the inner face of the wall, the hymenium does not split away from the margin when dry. Hymenium perfectly vertical with respect to the surface of the substrate. True paraphyses numerous, filiform. Asci very long-cylindrical, with a prominent apical cap, 8-spored. Ascospores filiform, colorless, transversely multiseptate, not disarticulating

On wood and bark, Europe. *Ostropa* differs from *Robergea* in having vertically-oriented fruitbodies which are orbicular in cross section, and from *Stictis* sect. *Lichenopsis* in lacking parietal periphysoids.

Fries considered his genus to belong to the pyrenomycetes, a position accepted by many subsequent authors. *Ostropa* was assigned to the Hysteriaceae by Duby (1861) and Saccardo (1883), and to the Acrospermaceae by Fuckel (1870). Rehm (1887-96) was apparently the first to recognize the connection between *Ostropa, Stictis,* and *Robergea.*

Most recent authors have considered *Ostropa* to be monotypic. I am unable at present to characterize several of the older species. Of those I have examined, only *O. cinerea,* with two varieties, is accepted.

(1). (OSTROPA ALBO-CINCTA Berk. & Curt., J. Linn. Soc. Bot. 10: 372 (1868)

≡ *Ostropella albo-cincta* (Berk. & Curt.) Höhn., Ann. Mycol. 16: 144 (1918)

According to Müller and von Arx (1962), the species is a member of the Lophiostomataceae (Loculoascomycetes).

(2). OSTROPA BARBARA (Fr.) Nannf.

= *Ostropa cinerea* (Pers.) Fr., q.v.

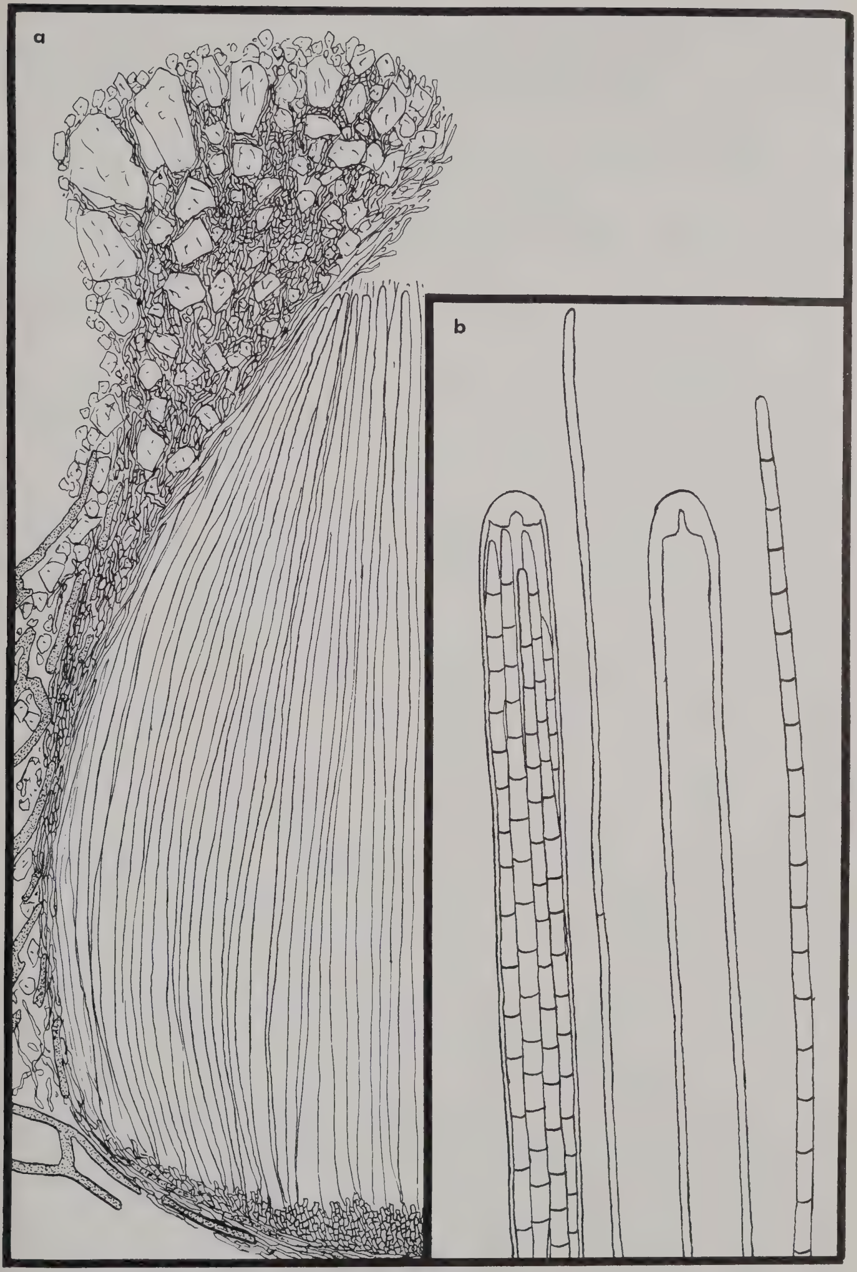

FIGURE 19. *Ostropa cinerea*. a. Cross section of margin, x300. b. Detail of apices of asci, paraphyses, and spores, x1500. Drawn from CUP-Rabenhorst F. Eur. 634.

Assuming that *Sphaeria barbara* Fr. is a synonym of *Hysterium cinereum* Pers., a position questioned by Rehm (1887 -1896), *O. barbara* is the correct name for the species under the current International Code of Botanical Nomenclature.

(*4a*). *OSTROPA CINEREA* (Pers.) Fr., Syst. Orbis Vegetabilis 109 (1825) var. *CINEREA*

≡ *Hysterium cinereum* Pers., l.c.
= *Tuberculostoma sphaerocephalum* Sollm., Hedwigia 3: 116 (1864)
= *Sphaeria barbara* Fries, Syst. mycol. 2(2): 468 (1823)
  ≡ *Ostropa barbara* (Fr.) Nannf., Nova Acta Regiae Soc. Sci. Upsal IV, 8(2): 78 (1932)

Figure 19

Apothecia at first immersed, soon becoming erumpent, black, white-pruinose, 0.75-1.2 mm broad, orbicular in cross section, the upper 1/3-1/2 exposed, opening by a prominent transverse slit. Margin, in cross section, of interwoven hyphae 1.5-2.0 µm diam., dark brown, 20 µm thick in the lower half, greatly expanded (to 200 µm) above to form the two lips flanking the opening slit, with numerous crystalline inclusions. A rudimentary periphysoidal layer is present above the level of the asci. Subhymenium brown. Paraphyses numerous, filiform, 1.0 µm broad, colorless throughout, scarcely enlarged above, simple, not forming an epithecium. Asci 400-450(-500) x 6-7 µm, strictly cylindrical, thick-walled when young, the cap 3.0 µm thick, pierced by a broad pore. Spores 8, nearly as long as the asci, 1.75-2.0 µm broad, septate, the cells 4-5 µm long. The hymenium is J- in most specimens, but may be faintly J+ in old material.

On wood and bark, Europe. Also reported from Algeria (Bory & Durieu, 1850) and the Canary Islands (Urries, 1957); I have seen no specimens from either of these localities.

SPECIMENS EXAMINED: EUROPE: Italy (CUP-Rabenhorst, Fungi Europaei 634, on *Cupressus*). Finland (UPS, Karsten 10.I.1870, on *Syringa*). Norway (O, on *Populus*, Sommerfeldt, as *Sphaeria rimalis*; Christiana, n.d.; Rostrup, on *Pyrus*, Abbediengen). Switzerland (BERN, on *Fagus*, labelled *O. cinerea* forma *vulgaris*).

(4b). *OSTROPA CINEREA* (Pers.) Fr. var. VIRENS (Otth) Sherwood, stat. et comb. nov.

≡ *Ostropa virens* Otth, Mitth. Naturf. Ges. Bern 1868: 55 (1868)

O cinerea var. *virens* differs from the typical variety in having a yellow-green to olive-green, pruinose margin, darkening in KOH, and asci which are 600-700 µm long. Intergrades between the two varieties occur; these are brownish and have asci 600 µm long. The slender evidence at hand would seem to indicate that *O. cinerea* is a variable species, and that variations in fruitbody color and ascus length are not expressions of developmental stages. Extremes of the two varieties do not occur in a single collection.

SPECIMENS EXAMINED: EUROPE: Switzerland (BERN, Steffisberg, on *Prunus spinosa*, lectotype, designated here; auf Kirschbaumzweigen, Bern, lectoparatype; on *Prunus padus*, lectoparatype, Bern; on *Crataegus* [brown form with asci of intermediate length], labelled *O. cinerea*)

(5). OSTROPA CINEREA (Pers.) Fr. var. *SINGULARIS* Duby in Rehm, pro synon. (not validly published)

≡ *Robergea singularis* (Duby) Rehm, q.v.

(6). (OSTROPA FUSCA)(Schw.) Fr., Syst. Orbis Vegetabilis 109 (1825)

≡ *Sphaeria fusca* Schw., Schriften Naturf. Ges. Leipzig 1: 43 (1822)

I have seen no material of this species, and the published descriptions give no indication of its correct placement.

(7). (OSTROPA INDICA) Tilak & Kale, Sydowia 24: 83 "1970" (1971)

I received no response to requests for type specimens from the above authors. The illustration of *O. indica*, alleged to open circularly or by a slit and have an exposed hymenium, suggest that the species is a *Schizoxylon.*

(8). (OSTROPA MELLEA) Dearness & House

≡ *Schizoxylon melleum* (Dearn. & House) Sherwood, q.v.

(9). (OSTROPA OCULATA) (Fr. & Mont.) Sacc., Sylloge fung. 2: 805 (1883)

≡ *Sphaeria oculata* Fr. & Mont., Ann. Sci. Nat. Bot. sér. 2, 1: 342 (1836)

Described as having orbicular, didimate, dark grey perithecia surmounted by a white pruinose disc marked by a black papilla, and long-cylindrical, polysporous asci, this can hardly be an *Ostropa,* but may be a *Schizoxylon.*

(10). (OSTROPA RUGULOSA) Schw., Trans. Amer. Philos. Soc. n.s. 4: 227 (1832)

The type specimen consists of an irregularly weathered stromatic crust, containing no recognizable fruitbodies.

SPECIMEN EXAMINED: NORTH AMERICA: USA (PH, in trunco Juglandis, Erie tract, holotype of *O. rugulosa*)

(11). (OSTROPA SPHAEROIDES) Schw., l.c.

The type specimen is an overmature pyrenomycete. No asci or spores were found.

SPECIMEN EXAMINED: NORTH AMERICA: USA (PH, New England, Dr. Torrey, holotype of *O. sphaeroides*)

(12). (OSTROPA TRUNCATA) (Pers.) Fr., Summa Veg. Scand. sect. post. 401 (1849)

≡ *Hysterium truncatum* Pers., Syn. Meth. Fung. 98 (1801)
≡ *Sphaeria truncatum* (Pers.) Fr., Syst. Mycol. 2(2): 468 (1823), non *S. truncatum* Schw., Schrift. Naturf. Ges. Leipzig 1: (1822)
≡ *Sphaeria truncatulum* Fr., Syst. Mycol. 2(2): 619 (1823)

The substitution of *S. truncatulum* for *S. truncatum* in the index of the second volume of Systema Mycologicum appears to be a deliberate attempt to avoid conflict with *S. truncatum* Schw. I have seen no material of this species.

(13). *OSTROPA VIRENS* Otth
≡ *Ostropa cinerea* (Pers.) Fr. var. *virens* (Otth) Sherwood (4b, above)

(55). *PHAEOBOLUS* Fr.

Ainsworth et al. (1971) list this name as "= *Stictis* (Phacid.) fide Berkeley." I have searched Fries's publications for this name without success.

(56). *(PHANEROMYCES)* Speg. & Har., Rev. Mycol. (Toulouse) 11: 93 (1889)

Holotype species: "*Niptera macrospora* Boudier, Fung. C. Horn no. 96" (? unpublished name from herbarium label) = *Phaneromyces macrosporus* Speg. & Har., l.c.

According to the original description, *P. macrosporus* occurred on rotten wood and had apothecia which were superficial except for the base which was inserted in the substrate. The thick margin was involute and white-furfuraceous, the disc olive black. The large (150-160 x 20-22 μm), thick-walled asci contained four or fewer, elongate-ellipsoid, inequilateral, 4-5-loculate or pseudoseptate ascospores, and were surrounded by branched paraphyses. Spegazzini cited lack of hymenial iodine reactions and gonidia as indications that *Phaneromyces* was not a lichen. He considered it intermediate between *Stictis* and *Patellaria*. It is unlikely that the species is Ostropalean, but it would be desirable to examine the type to discover what the exact taxonomic position of the genus is. It may be a member of the Patellariaceae.

(57). *(PHRAGMONAEVIA)* Rehm in Rabenh., Krypt.-fl. ed. 2, 1(3): 160 (1888)

Lectotype species: *Cryptodiscus libertianus* Sacc. & Roum., Atti Reale Ist. Veneto Sci., Lett., Arti VI 2: 444 (1884), designated by Clements and Shear (1931)

Saccardo's type specimen no longer contains any mature apothecia. *Cryptodiscus libertianus* occurs immersed underneath the bark of small twigs (? *Salix*, according to Saccardo). The apothecia raise the bark into small, brown, transluscent pustules which eventually open by splitting the overlying substrate into 3-4 teeth. The marginal tissue is brown, scanty, and composed of hyphae lying parallel to the surface of the substrate. Immature asci are globose, long-stalked, and lack an iodine reaction; according to the original description the mature asci were short-stalked, thick-walled, and had a J+ blue pore. The ascospores were described as being biseriate, obtuse, 3-sepate, and colorless, measuring 20-25 x 5-6 μm. Rehm compared the species to *Cryptodiscus angulosus* Karst.

I am unable to characterize the lectotype of *Phragmonaevia* on the basis of the material that I have seen; it seems to be neither closely related to *Stictis* nor to be a member of the Naevioideae. Nine of Rehm's original included species are treated in *Hysteropezizella* or *Merostictis* by Nannfeldt (1932) or Défago (1967); the remaining three are of doubtful taxonomic position.

SPECIMEN EXAMINED: EUROPE: Belgium (PAD, on *Salix*, Malmédy, Libert 844, holotype of *Cryptodiscus libertianus*)

(58). *(PLATYGRAPHA)* Berk. & Br., J. Linn. Soc., Bot. 11: 110 (1870) non *Platygrapha* Nyl., Mém. Soc. Sci. Nat. Cherbourg 3: 149 (1855)

Lectotype species: Apparently never typified. Since the name is illegitimate and I have seen only one of the included species, *P. magnifica* Berk. & Br., I have not designated a lectotype here. Judging from the protologue and the one species I have examined (Sherwood, 1976), the synonymy with *Cryptodiscus* proposed by Saccardo (1889) is incorrect, and the other species will prove to be lichens in the Thelotremataceae.

(59). *PLATYSTICTA* Cke. & Mass., Grevillea 17: 95 (1889)

Lectotype species: *Platysticta simulans* Cke. & Mass., designated by Saccardo (1889)
= *Lichenopsis* Schw.

According to Sherwood (1976), *P. simulans* is an abnormal, muriform-spored variant of *Stictis (Lichenopsis) sphaeroboloidea*, q.v.

(60). *(PLEIOSTICTIS)* Rehm, Ascom. Lojk. 24 (1883)

Holotype species: *Pleiostictis propolidoides* Rehm, l.c.
= *Melittosporium* Corda

Rehm (1887-1896) transferred *P. propolidoides* to *Melittosporium*. It had intially been considered distinct because the asci were 1-spored. My own investigations confirm that the two genera differ only in the number of spores per ascus. Both are Hysterialean, rather than Ostropalean.

SPECIMENS EXAMINED: EUROPE: (S, on *Pinus*, sine loc., probable holotype of *Pleiostictis propolidoides*). NORTH AMERICA: Canada (FH, on *Abies*, LaClair, IX.1888, det. Rehm)

(61). *(PLOETTNERA)* P. Henn., Verh. Bot. Vereins Prov. Brandenberg 41: 94 (1889)

Holotype species: *Cryptodiscus coeruleo-viridis* Rehm in Brefeld, Mycol..Untersuch. 10: 250 (1891)

According to Nannfeldt (1932), *Ploettnera* may be related to *Ocellaria*. He was unable to find good material on which to base a redescription. The genus is considered by Hein (1976) to belong to the Naevioideae, by Korf (1973) to the Peziculoideae.

(62). *PROPOLIDIUM* Sacc., Botan. Centralbl. 18: 250 (1884)

Holotype species: *Propolis glauca* Ell., Bull. Torrey Bot. Club 8: 65 (1881)

Apothecia at first immersed, opening by splitting the overlying substrate irregularly but not becoming erumpent, small to middle-sized, orbicular to irregular or somewhat elongate in outline, the margin entire or lacerate, consisting predominantly of host tissue, the disc immersed but not deeply urceolate, splitting away from the margin when dry.

Basal stroma present or absent. Margin in cross section more or less 3-layered, consisting of a non-carbonized wall, irregular crystalline layer, and inward-projecting periphysoids. Paraphyses numerous, filiform, somewhat enlarged at the tip and forming a rudimentary epithecium, J+ or J-. Asci cylindrical, with thin lateral walls and a thickened apex pierced by a J- pore. Ascospores 8, colorless, ovoid, few-septate with thin cross-walls, prominently sheathed.

On bark. *Propolidium glaucum* is apparently restricted to North America. A second African species is described below.

In Saccardo's original treatment, *Propolidium* was proposed for *Propolis* spp. with 2-celled spores. It is doubtful that he examined the type species critically, for in 1889 he transferred *Stictis foveolaris*, a typical *Cryptodiscus*, to *Propolidium* on the strength of the 1-septate spores. Rehm (1887-1896) expanded the generic concept to include species with multiseptate spores, but according to von Höhnel (1918a) the species he included properly belong in *Xylogramma* or *Durella*. Von Höhnel assigned *Propolidium* to the Cryptomycetaceae. Nannfeldt (1932) examined the type, which he considered to be neither Phacidealean nor Ostropalean, but could not place it.

P. glaucum is far from being a typical Ostropalean fungus, but shares cylindrical, capitate, J- asci and a margin lined with periphysoids with more typical members of the order. *P. pruinosum*, a second species, may be transitional between *P. glaucum* and species of *Stictis* with few-celled spores. *Propolidium* may also be related to *Melittosporiella* and *Karstenia*.

(1). *PROPOLIDIUM GLAUCUM* (Ell.) Sacc., Botan. Centralbl. 18: 250 (1884).

≡ *Propolis glauca* Ell.

Figure 20

Apothecia at first immersed, opening by tearing the overlying substrate irregularly but not becoming erumpent,

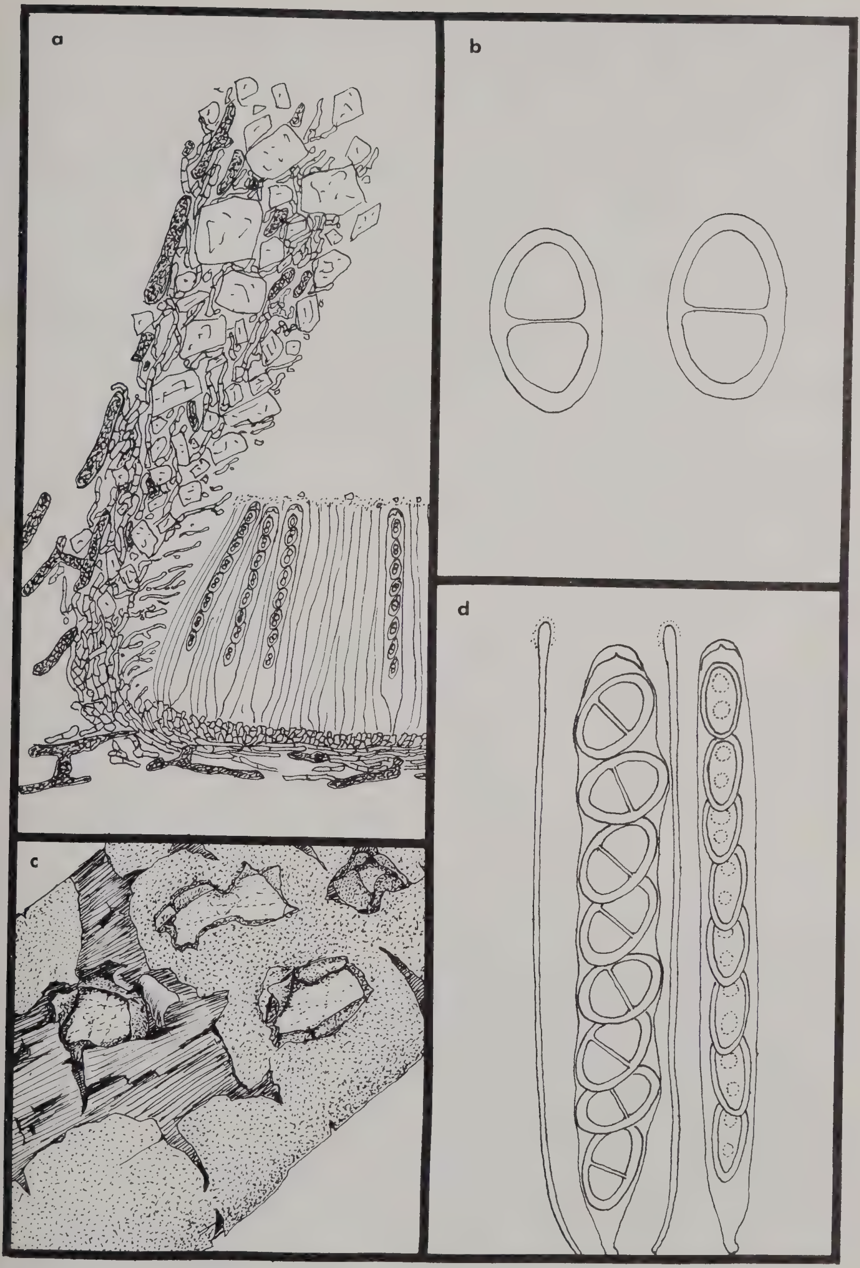

FIGURE 20. *Propolidium glaucum*. a. Cross section of apothecium, x300. b. Ascospores, x1500. c. Habit sketch, x7.5. d. Asci, paraphyses, and spores. x750. Drawn from CUP-Ell. & Ev., Fungi Columbiani 815.

1.5-2.0 x 1.0-1.5 mm, the margin reflexed, lacerate, white-pruinose, the disc immersed but not deeply urceolate, grey-pruinose.

Margin, in cross section, c. 100-120 μm thick, of loosely interwoven brown hyphae 1.5-2.0 μm diam. intermingle with numerous crystals, with a layer of sparse periphysoids 10-15 x 1.5 μm on the inner face. Basal stroma dark brown, c. 10 μm thick. Subhymenium 10 μm thick, of small, colorles isodiametric cells 1.5 μm diam., J-. Paraphyses numerous, filiform, enlarged to 1.5-2.0 μm at the tip which is crystaliferous and imbedded in brown gel, J-. Asci cylindrical, 100-115 x 12-15 μm, thick-walled when young, with an indistinct apical cap, J-. Ascospores 8, broadly ovoid, 15-18 x 10-12 μm, 1-septate, with a very thick wall and spherical cell lumen, J-.

On corticate oak twigs, Eastern North America.

SPECIMENS EXAMINED: NORTH AMERICA: USA (CUP-Fungi Columbiani 815, on *Quercus*, New Jersey, VI.1895 [authentic]; Ellis, North American Fungi 454; Rehm, Ascom. 465, on *Quercus*, Westchester Pennsylvania, IX.1879) (Herb. Sherwood 2283, New York, 23.X.1976)

(2). PROPOLIDIUM PRUINOSUM Sherwood, spec. nov.

Figure 21

Ascocarpi primum immersi, non profunde cupulati, 0.3 usque ad 0.4 mm diam., margine integro vel lacerato, albo, disco griseo. Margo in sectione transversali 20 μm crassus, siccus ab hymenio se abrumpens, hypharum pariete 2.0 μm diam., achromo. Stratum crystallinum 10 μm crassum. Periphysoidea 10.0 x 1.5-2.0 μm, non ramosa. Paraphyses filiformes, simplices, 80 x 1.0 μm, apice ad 2.0 μm incrassatae, achromae, in iodo caerulescentes. Asci 75-80 x 5(-6) μm, apice 2.0 μm crassi, 8-spori. Sporae 10-12.5 x 3-4 μm, cellulis 2.5-3 μm longis.

HOLOTYPUS: IMI 57347b, on dead stems of *Uvaria charae*, Njala (Keri), Sierra Leone, Compton, 30.VII.1954.

Apothecia densely gregarious (50 or more per cm^2), frequently confluent, 0.3-0.4 mm diam., angular in outline, immersed, but not deeply so, opening by a combination of dissolving and splitting the overlying substrate. Margin white-pruinose, narrow, entire or sometimes lacerate but not consisting of thick reflexed lobes of host tissue. Disc clear grey, waxy with a faint bloom, splitting away from the margin when dry. Margin 20 μm thick at the broadest point, colorless, pseudoparenchymatous and formed of cells 2.0 μm diam. in the part adjoining the overlying substrate. Crystalline layer incomplete, consisting of a few large crystals imbedded in the periphysoidal layer. Periphysoids 10.0 x 1.5-2.0 μm, unbranched. Subhymenium 5-10 μm thick, of small, colorless, angular cells resting directly on host tissue. Stroma none. Paraphyses 80 x 1.0 μm, enlarged gradually to 2.0 μm at the tip, J+. Asci 75-80 x 5(-6) μm, strictly cylindrical, not markedly thick-walled when young, the apical cap 2.0 μm thick, pierced by a narrow pore. Asco-

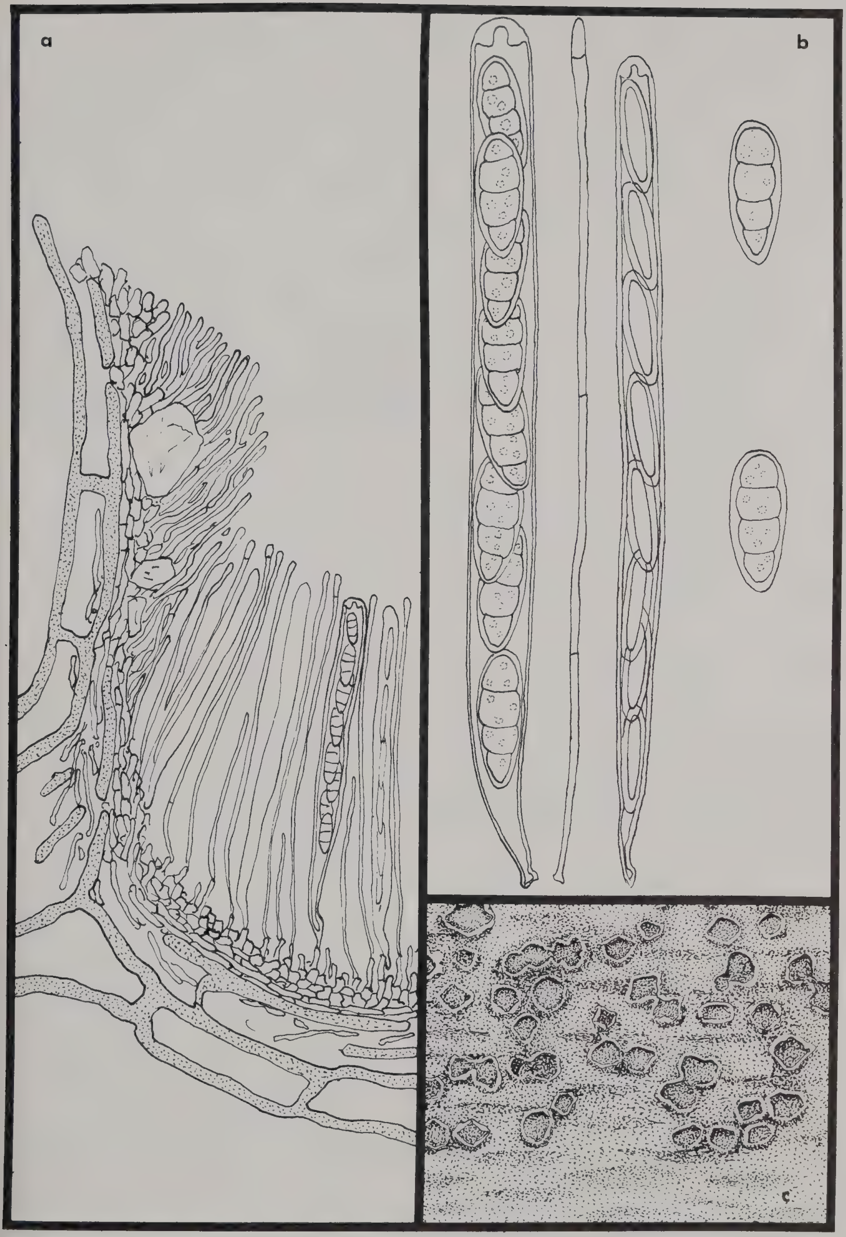

FIGURE 21. *Propolidium pruinosum*. a. Cross section of margin, x750. b. Asci, paraphysis, and spores, x1500. c. Habit sketch, x 7.5. Drawn from the holotype.

spores 8, uniseriate, colorless, 3-septate and constricted at the septa, 10-12.5 x 3-4 µm, surrounded by a prominent gelatinous sheath.

On small woody stems, Sierra Leone. A distinct periphysoidal layer containing imbedded crystals excludes this species from *Cryptodiscus*. The species appears to be transitional between *Propolidium* and *Stictis*.

SPECIMEN EXAMINED: See holotype, above.

(63). *(PROPOLINA)* Sacc., Botan. Centralbl. 18: 250 (1884)

Holotype species: *Propolina cervina* Sacc., l.c.

Saccardo based his genus on the description and figures provided by Tulasne and Tulasne (1865: p. 127; pl. XVI: 4-8) of a fungus similar to *Stictis cinerascens (=Propolomyces farinosus)*, but with polysporous asci. No specimen is definitely associated with the description. Tulasne and Tulasne thought that the dehiscence of the many-spored form (but not the usual form) resembled that of the Pleosporae, for example *Sphaeria* (now *Pleospora*) *herbarum*. If this is correct, then *Propolina* belongs in the Loculoascomycetes. Boudier (1907) stated that *P. cervina* was often collected with *Propolis faginea (=Propolomyces farinosus)* and was frequently regarded as a simple polysporous form of it.

(64). *PROPOLIOPSIS* Rehm, Leafl. Phillip. Bot. 6: 2279 (1914)

Holotype species: *Propoliopsis arengae* Rehm, l.c.

Apothecia at first immersed, opening by splitting the overlying host tissue into 3 or more lobes which become reflexed to expose the disc. Disc immersed, but not deeply urceolate, pruinose, splitting away from the margin when dry. Margin, in cross section, poorly-developed, predominantly crystalline, adnate to stromatized host tissue, lined on the inside with sparse periphysoids. Basal stroma thick. Paraphyses numerous, filiform, branched repeatedly near their apices, intensely J+ blue throughout their entire lenth, forming an epithecium. Asci cylindrical, very thick-walled when young, appearing bitunicate but without a distinctly separable inner wall, J-. Ascospores long-cylindrical, colorless, transversely multiseptate, showing some tendency to disarticulate at the septa.

On leaves and inflorescences of palms and on herbaceous debris, Phillippines and tropical America. Unaccountably synonymized with *Cryptodiscus* by Clements and Shear (1931), *Propoliopsis* has an apothecial structure similar to that of *Propolidium*. Long-cylindrical ascospores and a J+ hymenium suggest *Stictis*. The asci are quite unlike anything found elsewhere in the Ostropales.

(1). PROPOLIOPSIS ARENGAE Rehm

Figure 22

Apothecia at first immersed, opening by splitting the overlying substrate into several irregular lobes, 0.5-1.2 mm

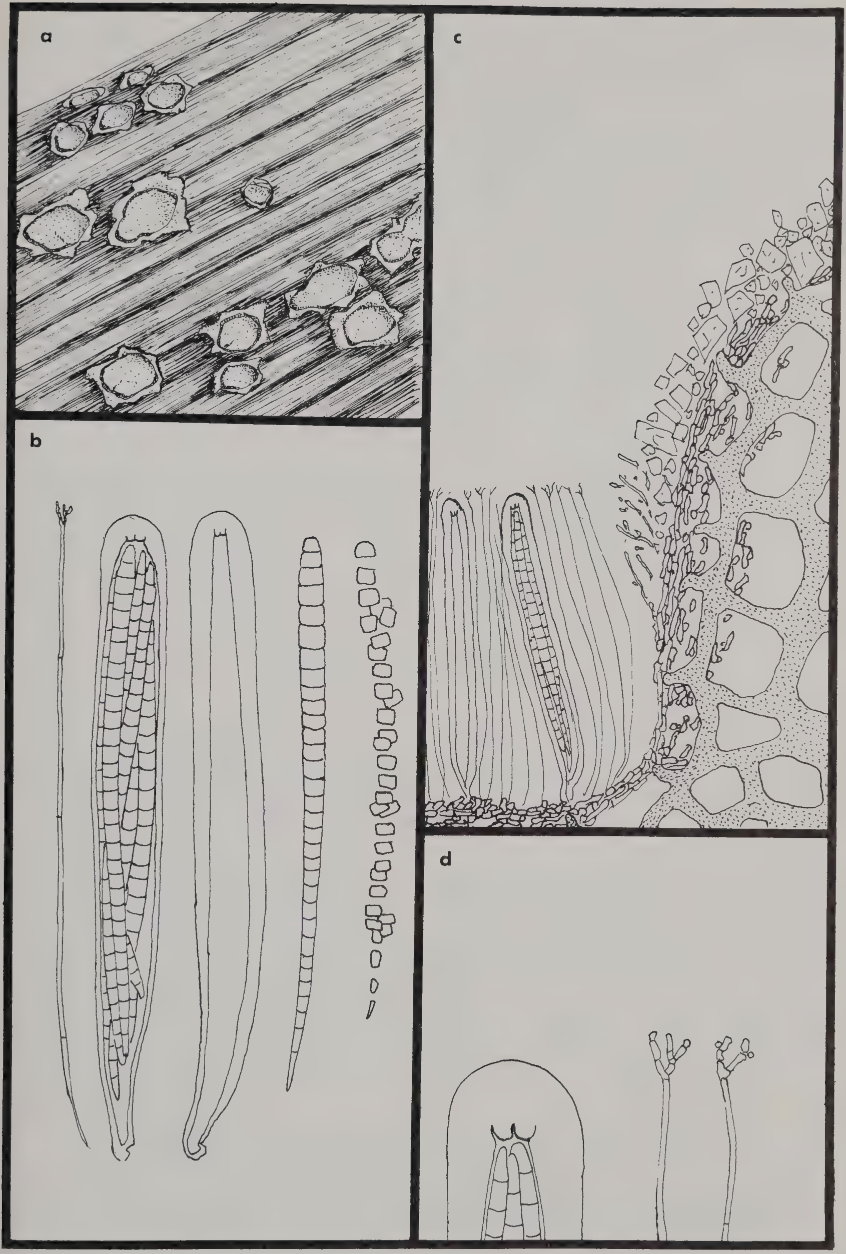

FIGURE 22. *Propoliopsis arengae*. a. Habit sketch, x7.5. b. Asci, paraphysis, and spores, x750. c, Cross section of apothecium, x375. d. Detail of ascus apex, x1500. Drawn from CUP-SA 1758.

diam., the margin thick, lacerate, white-pruinose, the disc immersed but not deeply urceolate, white-pruinose, splitting away from the margin when dry. Margin consisting of a stromatic layer c. 5 µm thick of dark brown hyphae 1.5-2.0 µm diam., a prominent crystalline layer, and sparse branched periphysoids c. 10 x 1.5 µm. Subhymenium pale brown, 15-20 µm thick, of isodiametric cells 2.0 µm diam., resting on a thick black base of stromatized substrate. Paraphyses numerous, filiform, branched near the apex and crystalliferous, J+ blue throughout their entire length. Asci very thick-walled when young, at length moderately thick-walled, with an apical cap 4.0 µm thick, appearing bitunicate but apparently without a separable inner wall, 80-100 x 10-12 (-25) µm. Ascospores 8, 60-80 x 4.0 µm, tapering below, transversely multiseptate, disarticulating in some specimens, the cells 3-4 µm long.

On leaves of Palmae and herbaceous debris, Phillippines and tropical America.

SPECIMENS EXAMINED: ASIA: Phillippines (S, Los Baños, S.A. Reyes IV.1913, C.F. Baker 2545a, on *Arenga*, holotype of *Propoliopsis arengae*). (CUP-SA-1758, on coconut inflorescence, Batan, Dumont, Pancho & Espinosa, 26. IX.1966). NORTH AMERICA: Panama (NY-Pa 1077, Prov. San Blas, K.P. Dumont, S.E. & S.M. Carpenter, 23.VII.1975)

(65). *(PROPOLIS)* (Fr.) Corda, Icones Fungorum 2: 38 (1838)

Lectotype species: *Stictis phacidioides* Fr., Syst. Mycol. 2(1): 197 (1822), designated by Corda (1838)
≡ *Stictis* subgen. *Propolis* Fr., l.c.

The taxonomy and nomenclatoral history of *Propolis* (Fr. Corda, a genus of foliicolous Phacidiales with acicular ascospores, are discussed in a separate paper (Sherwood, 1977

(66). *(PROPOLIS)* (Fr.) Fr., Summa Veg. Scand., sect. post. 372 (1849)

Lectotype species: *Stictis farinosa* Pers., Myc. Eur. 1: 339 (1822)
≡ *Propolomyces* Sherwood, Mycotaxon 5: 321 (1977)

The nomenclature of *Propolis* (Fr.) Fr., a genus of lignicolous Phacidiales with allantoid ascospores, and the reasons for the proposed name change, are discussed in a separate paper (Sherwood, 1977).

(67). *PSEUDOSTICTIS* Lambotte, Flore Mycol. Belg. suppl. 1: 260 (1887)

Lectotype species: *Peziza punctiformis* Pers., Syn. Meth. Fung. 674 (1801), designated here.
= *Cryptodiscus* Corda

The name *Peziza punctiformis* Pers. is an avowed substitute for *Stictis pallida* Pers., the epithet *pallida* being preoccupied in *Peziza*. I have designated *Peziza punctiformis (≡ Cryptodiscus pallidus)* as the lectotype of *Pseudostictis*, since it is unclear from the International Code of Botanical Nomenclature (Stafleu et al., 1972) whether the inclusion of a lectotype species automatically invalidates a generic name, particularly since *Cryptodiscus* was lectotypified after *Pseudostictis* was published.

(68). *(PYRENOTROCHILA)* Höhn., Ann. Mycol. 15: 332 (1917)

Lectotype species: *Phacidium laurocerasi* Desm., Pl. Crypt. France 1: 188, designated by Clements and Shear (1931)
= *Trochila* Fr., according to Clements and Shear (1931) and Dennis (1968).

(69). *RAMONIA* Stizenb., Ber. Thätigk. St. Gallischen Naturwiss. Ges. 1862: 168 (1862)

Holotype species: *Parmelia valenzueliana* Mont. in de la Sagra, Hist. Nat. Cuba 9: 205 (1845)

Apothecia at first immersed in lichen thallus, or in a combination of lichen thallus and plant substrate, opening by a pore but not becoming erumpent, the margin entire, fleshy, light-colored, the disc deeply immersed, splitting away from the margin when dry. Margin in cross section 2-layered, the wall of short-celled hyphae, more or less pseudoparenchymatous, the inner face lined with a compact layer of periphysoids. Hymenial iodine reactions absent. Paraphyses numerous, filiform, often knoblike at the tip. Asci cylindrical, with thin lateral walls and a J- apical cap. Ascospores 8 or more per ascus, colorless, thin-walled, non-graphidean, simple or transversely septate

Forming crustose lichen thalli; widespread but uncommon.

The systematics of *Ramonia* were reviewed by Vězda (1966), who proposed that the genus be removed from the Gyalectaceae and transferred to the Thelotremataceae. Thin-walled, J- spores place *Ramonia* closer to *Stictis* than to *Thelotrema*. The ontogeny of polysporous asci in *Ramonia* is unknown. One species (*Ramonia chrysophaea* [Pers.] Vězda) has long multiseptate spores.

Propolidium, and a few species of *Stictis*, agree with *Ramonia* in having discocarpous fructifications with periphysoidal margins, cylindrical, capitate,,annelascaceous inamyloid asci, and ovate or fusiform septate apores which do not turn purple in iodine solutions.

SPECIMENS EXAMINED: AFRICA: Kenya (Herb. Vězda, Maas Geesteranus 22.VII. 1949, isotype of *Ramonia micrococca* Vězda). NORTH AMERICA: USA (FH-Tuckerman, *Ramonia valenzueliana* (Mont.) Stiz., Florida, 1878)

(70). *ROBERGEA* Desm.

A detailed redescription of *Robergea*, and descriptions of accepted species, appears on page 96 , below.

(71). *(SARCOTROCHILA)* Höhn., Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Cl. Abt. 1, 126: 309 (1917)

Holotype species: *Stegia alpina* Fckl., Jahrb. Nassauischen Vereins Naturk. 29-30: 27 (1875)

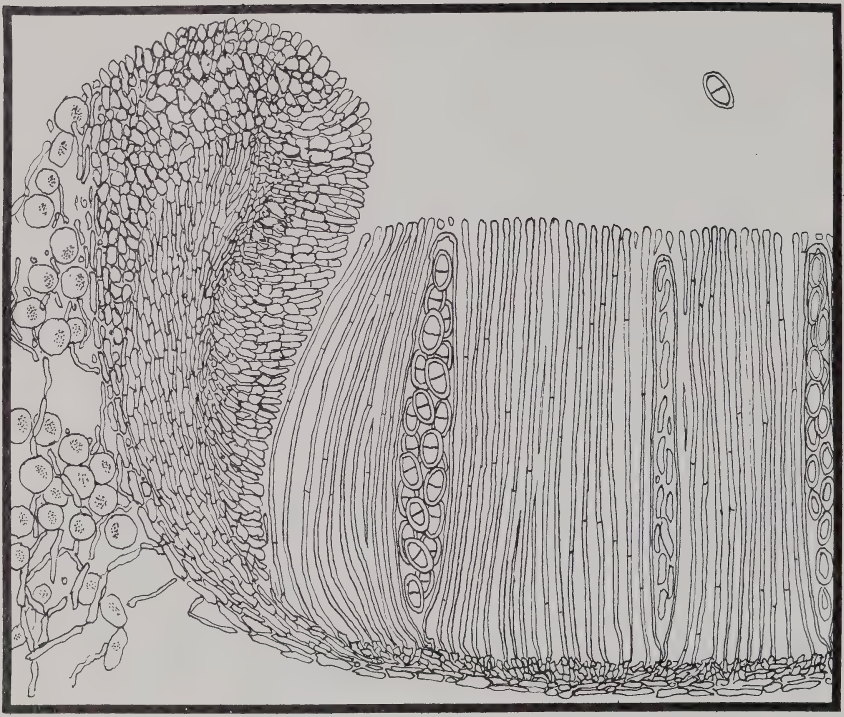

FIGURE 23. *Ramonia valenzueliana*. Cross section of apothecium, x750. Drawn from FH-Tuckerman, Austin 1878.

= *Stegopezizella* Sydow

According to Korf (1962), this is a genus of the Hemiphacidiaceae (Helotiales).

(72). *SCHIZOXYLON* Pers.

A detailed description of the genus, and a revision of the North American species, appears on page 108, below.

(73). *SCHMITZOMIA* Fr., Summa Veg. Scand., pars. post. 363 (1849)

Lecotype species (designated here): *Stictis radiata* Pers., Obs. Mycol. 2: 73 (1799)

= *Stictis* Pers.
= *Lichenopsis* Schw.
= *Cyclostoma* Crouan & Crouan

Assuming that the treatment in Rabenhorst (1844) (see the discussion of the lectotype of *Stictis*, below) constitutes lectotypification of *Stictis*, *Schmitzomia* falls into synonymy with *Stictis*. It should be noted, however, that Fries (1849) explicitly typified *Stictis* with *S. pallida*. If, as some authors argue, all of the species included by Fries (1822) must be considered as eligible as lectotype species, or if segregation out of the type subgenus does not constitute rejection of a species for purposes of implicit typification, then *Schmitzomia* becomes an available name for a genus typified by *Stictis radiata*.

(74). *SPHAEROLINA* Fuckel, Jahrb. Nassauischen Vereins Naturk. 15: 77 (1860)

Lectotype species: *Sphaerolina xantholeuca* Fckl., l.c. (designated here)
= *Schizoxylon* Pers.

Both Nannfeldt (1932) and Ainsworth et al. (1971) imply that *Sphaerolina xantholeuca (= Schizoxylon berkeleyanum)* is the type of the genus, but I can find no formal proposal for lectotypification of *Sphaerolina*. The other species have since been transferred to *Ophiobolus*.

(75). *(STEGIA)* FR., Obs. Mycol. 2: 352 (1818)

Holotype species: *Stegia discolor* Fr., l.c.
≡ *Eustegia* Fr., Syst. Mycol. 2(2): 352 (1823)

According to Sutton and Pirozynski (1963), *Stegia* Fr. is a later homonym of *Stegia* DC (Malvaceae), and *Eustegia* Fr. is a later homonym of *Eustegia* R. Br. (Asclepiadaceae). They could locate no original material, and regarded *Stegia* Fr. and its nomenclatoral synonyms as nomina dubia.

(76). *(STEGOPEZIZA)* Höhn., Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Kl. Abt. 1, 126: 308 (1917)

Holotype species: *Naevia lauri* Caldesi, Erb. Crittog. Ital. ser. 1: 491 (1863)

Sutton and Pirozynski (1963) discussed this species, which they felt to be allied to *Hysteropezizella*. Korf (1973) included it in the Hyaloscyphaceae.

(77). *(STEGOPEZIZELLA)* Sydow, Ann. Mycol. 22: 392 (1924)

Holotype species: *Phacidium balsameae* Davis, Trans. Wisconsin Acad. Sci. 20: 424 (1922)
= *Sarcotrochila* Hohn.

According to Korf (1962), this is a member of the Hemiphacidiaceae.

(78). *STICTIS* Pers.

A detailed redescription of *Stictis*, and descriptions of accepted species, appear on page 142, below.

(79). *STICTOPHACIDIUM* Rehm, Hedwigia 27: 367 (1888)

Holotype species: *Stictophacidium carniolicum* Rehm, l.c.

Apothecia at first immersed, irregular in outline, opening by splitting the overlying substrate irregularly, medium-sized. Margin well-developed, with a crystalliferous wall which splits away from surrounding host tissue and a compact inner layer of periphysoids. Hymenial iodine reactions absent. Paraphyses numerous, filiform. Asci some-

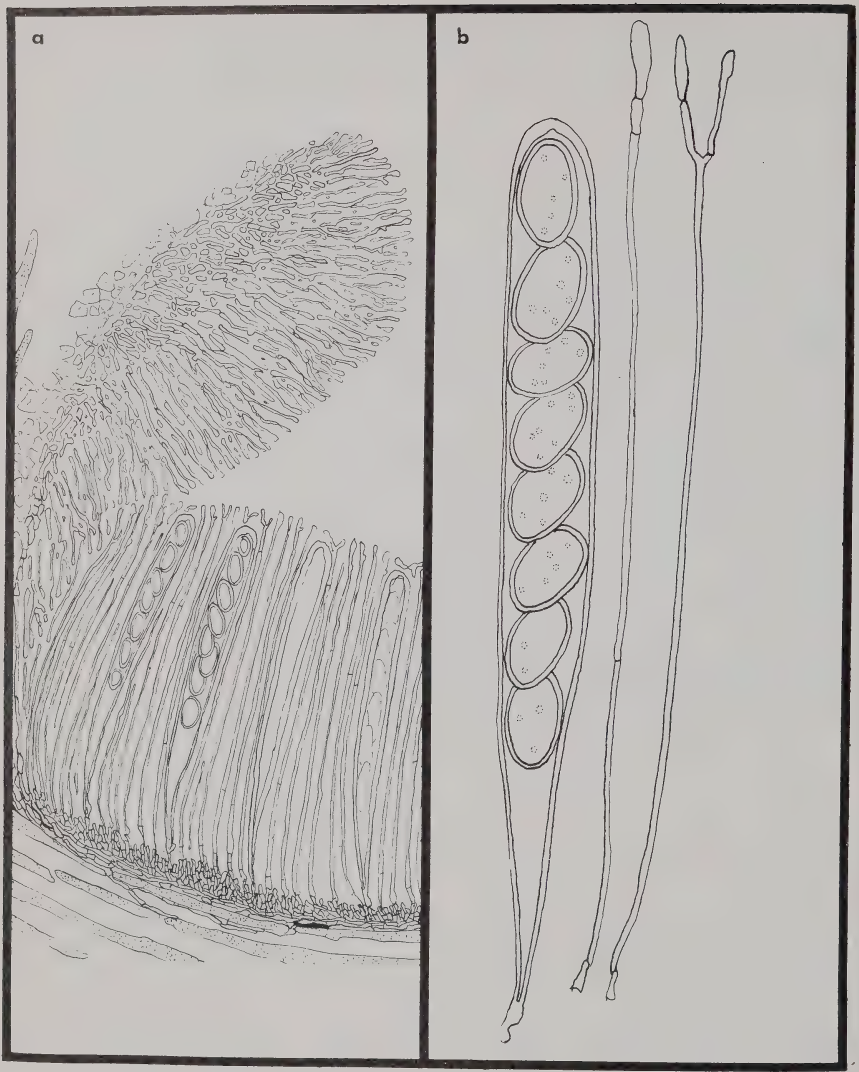

FIGURE 24. *Stictophacidium carniolicum.* a. Cross section of margin, x300. b. Ascus, paraphyses, and spores, x750. Drawn from NY-Krypt. Exs. Mus. Hist. Nat. Vindobon. 2731.

what thick-walled, not capitate, lacking a defined apical apparatus. Ascospores unicellular.

On bark, Europe. *S. carniolicum* is the only species which has been included in the genus. *Stictophacidium*,, with unicellular spores and non-capitate asci, is doubtfully Ostropalean. It is included here because it shares some features with *Propolidium* and cannot be accomodated in the

Phacidiaceae.

(1). *STICTOPHACIDIUM CARNIOLICUM* Rehm.

Figure 24

Apothecia at first immersed, opening by splitting the overlying bark irregularly, 0.5-3.0 x 0.5-1.5 mm, the margin thick, yellow-pruinose, splitting away from the surrounding host substrate, the disc deeply immersed, brown, splitting away from the margin when dry. Margin c. 100 µm thick at the broadest point, 2-layered, , the wall c. 30 µm thick, of vertically-oriented, short-celled, colorless hyphae 2-3 µm diam., with gelatinizing walls, the inner layer of abundantly branched periphysoids 40-60 x 1.5 µm, with knoblike tips, immersed in a gel. Subhymenium colorless, resting directly on host tissue. At the junction of the subhymenium and margin there is a ring of brown, thick-walled cells which may represent rudimentary stroma. Paraphyses numerous, filiform, 1.0 µm broad below, enlarged to 3 µm apically, often branched, immersed in a gel, J-. Asci 130-160 x 13-15 µm, cylindrical, short-stalked, somewhat thick walled, without a defined apical apparatus. Ascospores 8, unicellular, somewhat thick-walled, 13-22 x 9-10 µm.

On bark, Europe. According to Rehm, the spores were brown. They were colorless in the material which I examined. This was labelled "specim. orig.", but, according to Rehm, the type was collected in November, whereas the material from NY was collected in December.

SPECIMEN EXAMINED: EUROPE: Yugoslavia (NY-Krypt. Exs. Mus. Hist. Nat. Vindobon 2731, on *Cornus*, Ulrichsberg., m. Dec., S. Robič, possibly an isotype of *Stictophacidium carniolicum*)

(80). *(STICTOSTROMA)* Höhn., Ann. Mycol. 15: 322 (1917)

Holotype species: *Cryptomyces leopoldinus* Rehm, Ann. Mycol. 3: 227 (1905)

?= *Placuntium* Ehrenb., Sylv. Mycol. Berol. 17 (1818)

Clements and Shear (1931) synonymized *Stictostroma* with *Naevia*, a position which seems to have no justification. Our specimen of Rehm's Ascomyceten 1584 (CUP) is conidial, but strongly suggests that *Stictostroma* is allied to *Rhytisma*, from which von Höhnel separated it on the grounds that the entire cross section of the leaf was stromatized. Without examining ascigerous material I am uncertain about the placement of *Stictostroma*, but it may fall into synonymy with *Placuntium*, which also differs from *Rhytisma* in having a stroma which occupied the entire cross section of the leaf.

SPECIMEN EXAMINED: SOUTH AMERICA: Brazil (CUP-D-11905, on leaves, 10/1904, Dr. Rick, isotype of *Cryptomyces leopoldinus*)

(81). *THELOPSIS* Nyl., Mém. Soc. Sci. Nat. Cherbourg 3: 194 (1855)

Holotype species: *Thelopsis rubella* Nyl., l.c.

According to Vězda (1968), *Thelopsis*, which is characterized by unitunicate, J- asci, true paraphyses, periphyses, and polysporous asci containing J- spores, is isolated taxonomically from the majority of pyrenolichens and is closely allied to *Ramonia*. This opinion was evidently shared by Poelt (1973), who assigned *Thelopsis* to the Thelotremataceae, where it is out of place because of the non-graphidean spores. Possible objections to the inclusion of *Thelopsis* in the Ostropales include the uniformly thin-walled, non-capitate asci and a polysporous condition which, at least in *T. isiaca* Stiz., arises by initial delimitation of more than 8 spores.

(82). *(TROCHILA)* Fr., Summa Veg. Scand., sect. post. 387 (1849)

Holotype species: *Sphaeria craterium* DC., Flore franc. 2: 298 (1805)

Trochila is accepted as a genus of the Dermateaceae by Dennis (1968) and Hein (1976).

(83). *TUBERCULOSTOMA* Sollm., Hedwigia 3: 113 (1864)

Lectotype species: *Sphaeria lagenaeforme* Sollm., Bot. Zeitung (Berlin) 20: 380 (1862), designated by de Notaris (1867)
= *Robergea* Desm.

According to de Notaris (1867) and Fuckel (1870), *Tuberculostoma lagenaeforme* (Sollm.) Sollm. is a synonym of *Robergea cubicularis*.

(84). *(VIBRISSEA)* Fr., Syst. Mycol. 2(1): 31 (1822)

Lectotype species: *Leotia truncorum* Alb. & Schw., Consp. Fung. 297 (1805), designated by Clements and Shear (1931)
= *Leptosporium* Bonorden, Bot. Zeitung (Berlin) 15: 211 (1857)
= *Apostemidium* Karst.
  ≡ *Peziza* sect. *Apostemium* Karst.
= *Ophiogloea* Clem., Bull. Torrey Bot. Club 30: 806 (1903)

The taxonomy of *Vibrissea* has been reviewed by Sánchez and Korf (1966) and Sánchez (1967). *Vibrissea* is utterly unlike *Stictis* and its allies. The genus includes superficial, stalked or sessile, fleshy aquatic discomycetes which have an ectal excipulum of inflated cells with their long axes perpendicular to the suface of the excipulum, and a medullary excipulum of thin textura intricata. The structure which Sánchez and Korf (1966) termed a perihymenial zone is perhaps homologous to what Letrouit-Galinou (1968) called a parathecial apparatus. Bellemère (1959, 1967) outlined a sequence of development quite different from that of *Ostropa*, and analogous to that of typical genera of the Helotiales such as *Pyrenopeziza* and *Arachnopeziza*. He concluded that *Vibrissea* should be removed from the Ostropales.

The asci of *Vibrissea*, although long-cylindrical and somewhat thickened at the apex, have a J+ pore. Filiform, sometimes disarticulating spores are the main point of similarity between *Vibrissea* and core genera of the Ostropales. In the case of *Vibrissea* these are true aquatic spores.

I have no doubt that *Vibrissea* belongs in the Helotiales, although it cannot be comfortably accomodated in any of the existing families, as their limits are now conceived.

SPECIMENS EXAMINED: NORTH AMERICA: USA (CUP-47394, *V. decolorans* (Saut.) Sánchez & Korf, New York, 29.IV.1963; 48098, *V. filisporia* (Bon.) Korf & Sánchez, New York, 30.V.1964; 45436 *V. truncorum,* (Alb. & Schw.) Fr., New York, 9.VI.1961).

(85). *(XYLOGLYPHIS)* Clem., Gen. Fungi 64, 174 (1909)

Holotype species: *Hysterium striola* Fr., Elench. Fung. 2: 145 (1828)

Clements (L.c.) presumably based his genus on a description by Karsten (1871), adopted by Rehm (1887-96) of *Glonium striola* (Fr.) Karst., and Ascomycete with linear fruitbodies, spherical to ovoid asci, and spores constricted at the septa. I have not seen Karstens material, but judging from the description it is probably a hysterothecial Loculoascomycete. Fries's material (UPS: no collection data) is a pycnidial fungus in the Leptostromataceae. The pycnidia are subcuticular on herbaceous stems, open by a broad irregular pore, and are lined top and bottom with monophialides producing simple, cylindrical, guttulate spores 8.0 x 2.5 µm. I consider *Xyloglyphis* Clem. to be tied to the pycnidial type.

(86). *(XYLOGRAMMA)* Wallr., Fl. Crypt. Germ. 2: 509 (1833)

Lectotype species: *Stictis atrocyanea* Fr., Syst. Mycol. 2(1): 199 (1822) (designated here)
= *Durella* Tulasne & Tulasne

It is clear from Wallroth's (1833) protologue that *Xylogramma* was a substitute for Fries's two subgenera, *Stictis (Xylographa)* and *Stictis (Propolis)*. Neither of the two Friesian species explicitly included by Wallroth is a good choice of lectotype, since *S. versicolor* is now the type of *Melittosporium* and *S. stictica* has never been adequately characterized. *S. atrocyanea* is a well-characterized species (cfr. Dennis, 1956) and one of the original species in *Stictis (Propolis)*; I designate it as the lectotype in order to preserve the currently accepted concept of *Xylogramma* = *Durella* (Korf, 1973).

SPECIMENS EXAMINED: See *Stictis atrocyanea,* below.

(87). *(XYLOGRAPHA)* (Fr.) Fr., Summa Veg. Scand., sect. post. 372 (1849)

Lectotype species: *Lichen parallelus* Ach., Lich. Suec. Prodrom. 23 (1798), designated by Saccardo (1889)
≡ *Stictis* subgen. *Xylographa* Fr., Syst. Mycol. 2(1): 192 (1822)

Included by Fries (1849) in the Stictidaceae, *Xylographa* is now considered to be a lichen. The genus is characterized by immersed, elongate fruitbodies, a reduced, non-carbonized margin devoid of crystals and periphysoids, a J- hymenium, thick-walled asci lacking a defined apical apparatus, and unicellular, colorless, J- ascospores. Poelt (1973) placed *Xylographa* in the Agyriaceae, and suggested that its affinities were with the Lecideaceae, rather than with the Graphidaceae, where *Xylographa* was traditionally classified. On the basis of the material that I have seem this disposition seems to be reasonable.

SPECIMENS EXAMINED: NORTH AMERICA: USA (Herb. Sherwood 1065, *X. hians* Tuck., Oregon, 4.VI.1973; 1066, *X. abietina* [Pers.] Zahlbr. [= *Lichen parallelus* Ach.], Oregon, 4.VI.1973)

(88). *(XYLOPEZIA)* Höhn., Ann. Mycol. 15: 308 (1917)

Holotype species: *Stictis hemisphaerica* Fr., Syst. Mycol. 2(1): 196 (1822)

The only specimen of *Stictis hemisphaerica* in Fries's herbarium (UPS) has no collection data associated with it. It agrees with the protologue and may reasonably be assumed to be one of the specimens Fries had in hand when he described the species. This same fungus, or at any rate one scarcely distinct from it, is common in western North America; it was distributed (as *Odontotrema majusculum* Rehm) as California Fungi 1287. The black, oblong stromata are erumpent from well-rotted conifer wood. The single locule opens by a broad, orbicular pore, so that the fungus appears more Stictidaceous than Pleosporaceous. Pseudoparaphyses, attached at the top of the locule, and obviously bitunicate asci exclude *Xylopezia* from the Ostropales. Fries's specimen has colorless 3-septate ascospores, not constricted at the septa, 22 x 10 µm. The species which Rehm (1887-1896) and von Höhnel (1917b) identify as *S. hemisphaerica* has spores half as large and is probably misidentified. *Xylopezia* will not key in von Arx and Müller (1975) or Luttrell (1973), and may be an acceptable genus of Loculoascomycetes.

SPECIMENS EXAMINED: EUROPE? (UPS, herb. Fries, sine coll., presumed holotype of *Stictis hemisphaerica*). NORTH AMERICA (CUP-California Fungi 1287, on *Abies*)(Herb. Sherwood 1068, on *Pseudotsuga*, Oregon)

X. Special Part

CRYPTODISCUS, *ROBERGEA*, *SCHIZOXYLON* and *STICTIS*

(17). *CRYPTODISCUS* Cda., Icones Fungorum 2: 37 (1838)

Lectotype species: *Stictis pallida* Pers., Obs. Mycol. 2: 74 (1799), designated by Rehm (1887-96)
= *Pseudostictis* Lambotte
= *Diplocryptis* Clements

Apothecia at first completely immersed, opening by dissolving a pore in the substrate, not becoming erumpent, small, usually colorless, sometimes with a pale brown margin, the margin narrow, entire, non-crystalliferous, the disc deeply urceolate, not splitting away from the hymenium when dry.

Margin in cross section lacking differentiation into distinct layers, composed throughout of loosely interwoven hyphae, fleshy or gelatinous. Paraphyses numerous, filiform, J+ or J-, often with an abruptly enlarged tip. Asci cylindrical, with thin lateral walls and a distinct apical cap, J-. Ascospores colorless, thin-walled, transversely septate, usually ovate to short-cylindrical and few-celled.

Cryptodiscus is distinguished from *Stictis* by the complete absence of periphysoids and crystals, and from *Schizoxylon* by its smaller size, permanently immersed habit, and few-celled spores.

On bare wood, leaves of monocots and dicots, herbaceous stems, and woody fungi, throughout the humid parts of the world. The apothecia are so inconspicuous as to be almost invisible without the aid of a lens, and are infrequently collected.

C. pallidus and its allies were assigned to the Stictidaceae by Fries (1849), Fuckel (1870), Rehm (1887-1896), and Saccardo (1889), among others. Modern workers (Nannfeldt, 1932; Dennis, 1968; Korf, 1973) have preferred to refer *Cryptodiscus* to the Dermateaceae, where it occupies a position intermediate between the Peziculoideae and Naevioideae, allied to *Ocellaria*. As Nannfeldt (1932) pointed out, the reduced nature of the excipulum makes determination of family affinities difficult.

From my investigations of *Cryptodiscus* and *Stictis* I have concluded that the more recent interpretation is incorrect, and that the two genera are closely related. Apically thickened, unitunicate, J- asci, an immersed ascocarp opening by a pore, a hymenium which blues in iodine, lack of a true excipulum, and a tendency to grow on dry, weathered wood are all characters suggesting affinity. The two genera cannot be separated on spore characters, since a few species of *Stictis* have short-cylindrical, 3-septate or few-septate spores, and *C. speratus* , an otherwise typical *Cryptodiscus*, has long, multiseptate spores. The species described as *Propolidium pruinosum* (q.v., above) has characters in common with *Cryptodiscus*, *Propolidium*, and *Stictis*.

Cryptodiscus also exhibits some similarities to members of the lichen family Gyalectaceae, characterized by Vězda (1975) by immersed to erumpent apothecia with a paraplectenchymatous margin, knoblike paraphyses, asci which blue diffusely in iodine and lack a tholus, and thin-walled spores with angular cells. *Dimerella* and *Gyalecta* (Gyalectaceae sensu stricto) differ in having uniformly thin-walled asci and massive, erumpent, complex apothecia. The ascus structure of *Cryptodiscus* more closely resembles that of *Stictis*.

The six species accepted below are representative of the genus. Saccardo's (1889) uncritical transfer of all *Stictis* species reported to have 3-septate spores to *Cryptodiscus* led to the inclusion of a variety of unrelated lichenized and non-lichenized fungi in the genus.

(1). CRYPTODISCUS PALLIDUS (Pers.) Cda., Icones Fungorum 2: 37 (1838)

≡ *Stictis pallida* Pers.

≡ *Peziza (Stictis) punctiformis* Pers., Syn. Meth. Fung. 674 (1801)

≡ *Stictis punctiformis* (Pers.) Phill., Brit. Discom. 386 (1887), excl. specim. et descr.

≡ *Pseudostictis punctiformis* (Pers.) Lambotte, Flore Mycol. Belg. Suppl. 1: 26 (1887)
≡ *Ocellaria punctiformis* (Pers.) Sacc., Syll. Fung. 8: 657 (1889)
= *Stictis patellea* Cke., Grevillea 7: 14 (1878)
  ≡ *Cryptodiscus patelleus* (Cke) Sacc., Syll. Fung. 8: 673 (1889)

Figure 25

Apothecia at first completely immersed, opening by a pore (sometimes appearing to split the substrate lengthwise in wood that has a coarse grain), 0.2-0.3 mm diam., the margin thin, entire, colorless, the disc deeply immersed, pale ochraceous. Margin, in cross section, 20-25 µm thick, of colorless interwoven hyphae 1.5-2.0 µm diam., fleshy and slightly gelatinous when rehydrated, lacking differentiation into layers. Subhymenium c. 10 µm thick, colorless, resting directly on disintegrating host tissue. Paraphyses numerous, filiform, enlarged to 1.5 µm at the distinctly knoblike apex, J+ or J-. Asci cylindrical, 55-65 x 5-6(-8) µm, the cap 2.5 µm thick, with an indistinct pore. Ascospores 8, 12-16 x 3.5-5 µm, 3-septate, usually somewhat constricted at the septa, the second cell largest.

On fairly sound decorticate wood in temperate localities, infrequently collected but probably not rare.

Stictis patellea is based on a specimen, collected in New York, with an unusually shallowly cupulate disc and a margin which is dark because of included host material. In the Ithaca area this form is common on weathered, scarcely decayed twigs of American chestnut. I suspect the distinctive appearance of the fungus is due to the peculiar substrate; the trees have been dead for 30 years and nothing else seems to have colonized the twigs.

Persoon's name *Peziza (Stictis) punctiformis* is an avowed substitute for *Stictis pallida,* the epithet *pallida* being preoccupied in *Peziza.* Phillips used the name *Stictis punctiformis* for a very similar species *(S. foveolaris)*, a specimen of which was allegedly annotated as *S. punctiformis* by Persoon.

Persoon's herbarium contains one specimen (910.264-843) lablled *Stictis pallida.* It is correctly identified, well-preserved material, and is designated here as the type of the species, probably a neotype, since there is no collection data and it is doubtful that the type of the 1799 description was preserved. Specimen number 910.264-864, labelled *Stictis punctiformis,* is less abundant. It may well be correctly identified; I did not examine it microscopically.

SPECIMENS EXAMINED: EUROPE: locality unknown (L, Herb. Persoon 910.264-843, neotype of *Stictis pallida*). AFRICA: Canary Islands (CUP-MM 8, on wood, Tenerife). NORTH AMERICA: USA (K, on wood, New York, Gerard 212, holotype of *Stictis patellea*)(Herb. Sherwood 1906, on *Acer*; 1902, on *Castanea*; 2279, on wood; 2270, on wood; all from New York)

(2). CRYPTODISCUS FOVEOLARIS (Rehm) Rehm in Rabenh., Krypt.-Fl. Ed. 2, 1(3): 158 (1888)

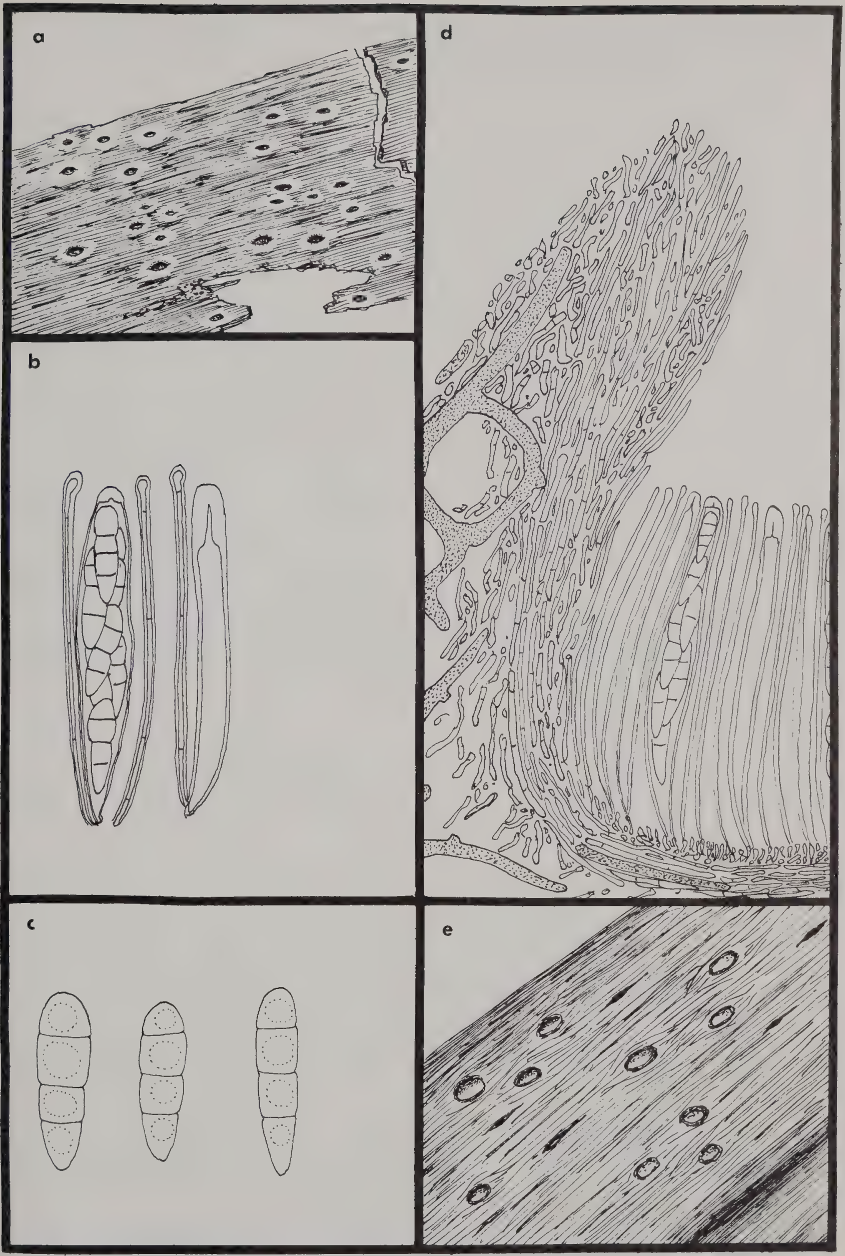

FIGURE 25. *Cryptodiscus pallidus*. a. Habit sketch, x7.5. b. Asci, paraphyses, and spores, x750. c. Ascospores, x1500. d. Cross section of apothecium, x750. e. Habit sketch, x7.5. a and c drawn from the neotype. b, d, and e drawn from Herb. Sherwood 1902.

≡ *Stictis foveolaris* Rehm, Ber. Naturhist. Vereins Augsberg 26: 33 (1881)
≡ *Propolidium foveolare* (Rehm) Sacc., Syll. Fung. 8: 668 (1888)
≡ *Diplocryptis foveolaris* (Rehm) Clements, Gen. Fungi 174 (1909)
= *Stictis fagicola* Phil., Brit. Discom. 385 (1887)
  ≡ *Stictis pallida* forma *fagicola* Phil., Elvellacei Britanici 200 (nom. nud.)

Apothecia immersed, opening by a pore, 0.2-0.3 mm diam., the margin colorless, narrow, entire, the disc deeply immersed, pale ochraceous. Margin, in cross section, c. 25 µm thick, of colorless interwoven hyphae 2.0 µm diam., lacking differentiation into layers. Asci 50-65 x 4-5 µm, thick-walled when young, the cap 2.5 µm thick. Paraphyses numerous, filiform, 1.0 m broad, enlarged to 1.5 µm at the knoblike apex, J- (J+ according to Rehm). Spores 6-9 x 2.5-3 µm.
On fairly sound wood, Europe and North America. Probably fairly common, but rarely collected; distinguished from *C. pallidus* only by the smaller, 1-septate spores. No specimen identified as *Stictis fagicola* could be located in Phillips' herbarium at K. Elvellacei Britanici 200 may well be an isotype.

SPECIMENS EXAMINED: EUROPE: Belgium (PD, in herb. Sacc., labelled '*S. punctiformis*). France (CUP-D-105-12, Rehm Ascom. 121, on *Quercus*, isotype of *Stictis foveolaris*). Britain (CUP-D-11201, Elvellacei Britanici 200, *Stictis pallida* forma *fagicola*, presumed isotype of *Stictis fagicola*). NORTH AMERICA: USA (Herb. Sherwood 1905, on *Castanea*, New York; 1972, on *Populus*, *ibid.*; 2191, on *Quercus*, *ibid.*)

(3). *CRYPTODISCUS MICROSTOMUS* (Carmichael apud Berk. in Hooker) Sacc., Syll. Fung. 8: 672 (1889)
≡ *Stictis microstoma* Carm. apud Berk. in Hooker, Engl. Fl. 5: 213 (1836) (ut *'sicrostoma'*, lapsus calami)

Figure 26, a-b

Apothecia immersed in decorticated wood, 0.5 mm diam., the margin thin, dark brown, entire, the disc deeply urceolate, pale ochraceous. Margin c. 40-50 µm thick, of loosely interwoven non-carbonized brown hyphae 1.5 µm diam., not crystalliferous, showing no differentiation into layers. Asci cylindrical, c. 90 x 7.5-8 µm, thick-walled when young, the cap 1.5 µm thick. Paraphyses numerous, filiform, J-, 1.0 µm thick, forked near the tip and scarcely enlarged. Spores 8, 14-16 x (3-)4-5 µm, 3-septate, constricted at the septa.
The type specimen contains few apothecia and may be slightly immature. I have seen no other collections which might be referred to this species, which is distinguished from *C. pallidus* by the dark margin and absence of knoblike tips on the paraphyses.

SPECIMEN EXAMINED: EUROPE: Great Britain (K, presumed holotype specimen, no collection data)

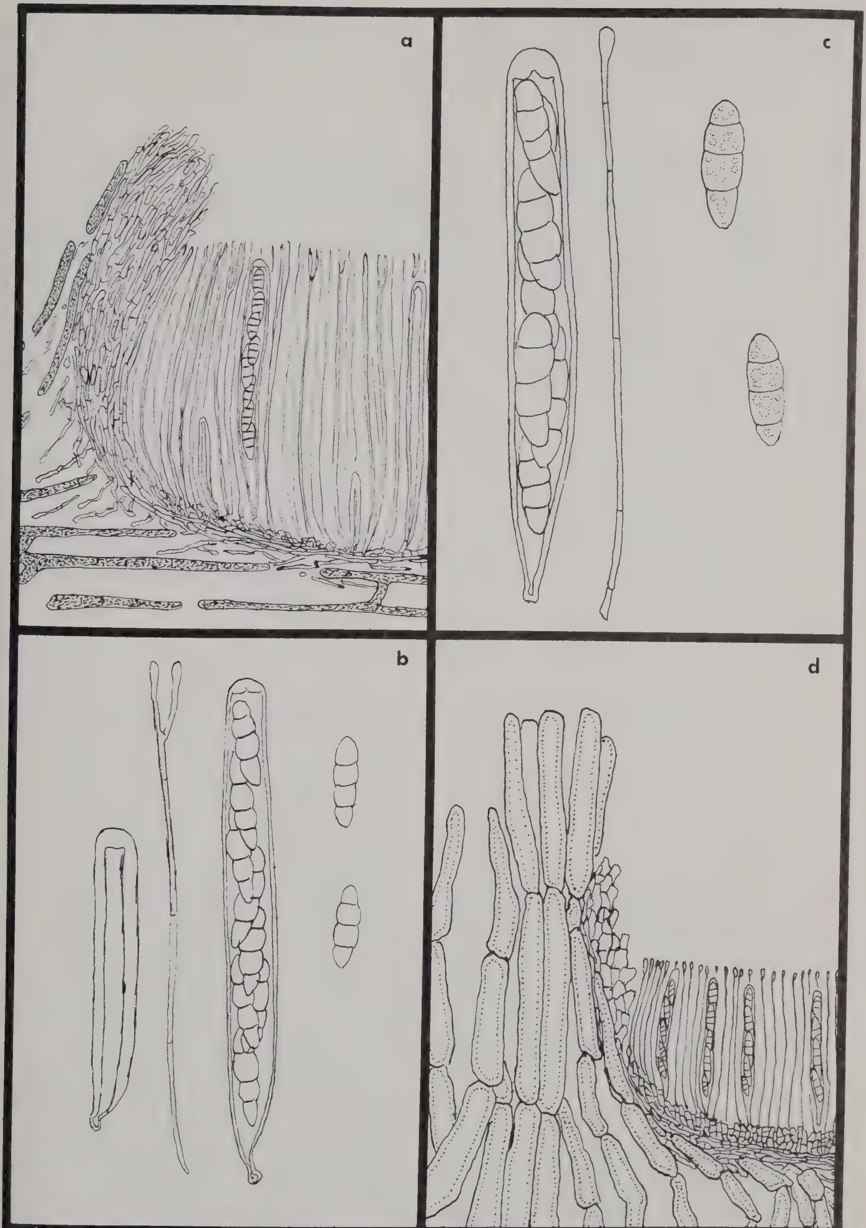

FIGURE 26. a-b. *Cryptodiscus microstomus*. a. Cross section of margin, x375. b. Asci, paraphysis, and spores, x750. Drawn from the holotype. c-d. *Cryptodiscus stereicola*. c. Ascus, paraphysis, and spores, x750. d. Cross section of margin, x375. Drawn from CUP-Fairman 194.

(4). CRYPTODISCUS STEREICOLA (Berk. & Curt.) Sherwood, comb. nov.

≡ *Stictis stereicola* Berk. & Curt., Grevillea 4: 7 (1875)

Figure 26, c-d

Apothecia immersed in host basidiocarp, opening by a pore, 0.2-0.3 mm broad, the disc deeply immersed, brown (brown host tissue showing through a colorless hymenium), the margin pale cinnamon color, the visible part consisting entirely of host hyphae. Margin, in cross section, 15 µm thick, colorless, pseudoparenchymatous, of roughly isodiametric cells 3 µm diam. Paraphyses filiform, 1.0 µm broad, ending in a knoblike tip 1.5 µm diam., J-. Asci 48-52 x 5.0 µm, the cap 3 µm thick. Ascospores 8, 9-13 x 3-3.5 µm, 3-septate, multiguttulate, slightly constricted at the septa.

On *Stereum* spp., eastern North America; distinguished from *C. pallidus* by the smaller spores, host range, and pseudoparenchymatous margin.

SPECIMENS EXAMINED: NORTH AMERICA: USA (K, Michener in Ravenel, 2289, on *Stereum frustulosum*, Pennsylvania, holotype of *Stictis stereicola*) (FH, Ravenel 2289, isotype)(CUP-Fairman 194, New York, on *Stereum*; D-7968, Kellerman 302, Ohio; D-7567, Florida, on *Stereum subpileatum*).

(5). CRYPTODISCUS PUMILUS Sherwood, spec. nov.

Figure 27

Ascocarpi primum immersi, profunde cupulati, 25 usque ad 100 µm diam., margine integro, albo, disco pallide ochraceo. Margo in sectione transversali 5.0 µm crassus, siccus ab hymenio se non abrumpens, ex hyphis intertextis achromis constans. Paraphyses filiformes, 70 x 0.5 µm, apice ad 1.0-1.5 µm incrassatae, achromae, in iodo non caerulescentes. Asci 65-70 x 4.5-5.5 µm, apice 4 µm crassi, 8-spori. Sporae 18-25 x 4.5-5.5 µm, cellulis 4-5 µm longis.

HOLOTYPUS: FH-Fungi of Guadeloupe, F.W.I. 874b, on decaying palm frond, Parc Tropicale, D.H. Pfister, S.E. Carpenter & M. A. Sherwood, Jan. 4, 1974. ISOTYPUS: CUP-Gu-51

Apothecia gregarious in pale, obscurely discolored spots on long-dead leaves of an unidentified palm, 100-150 µm in diameter at the base, visible on the surface of the host as minute, unbordered pores 25 µm diam., Disc pale ochraceous, deeply immersed, not splitting away from the margin when dry. Margin 5 µm broad or less, consisting of colorless interwoven hyphae 2-3 µm diam., closely adnate to the leaf epidermis. Paraphyses filiform, barely exceeding the asci in length, 0.5 µm broad below, enlarged to 1.5 µm at the knoblike tip, J-. Asci 65-70 x 5(-7) µm, the cap 4 µm thick, Spores 8, 18-25 x 4.5-5.5 µm, 5-septate, guttulate, slightly constricted at the septa.

This does not correspond to the description of any known species of *Cryptodiscus*. The minute, colorless, immersed apothecia are invisible even at 10x magnification, and I discovered them quite by accident while sorting a collection of a *Dasyscyphus* under a binocular dissecting microscope.

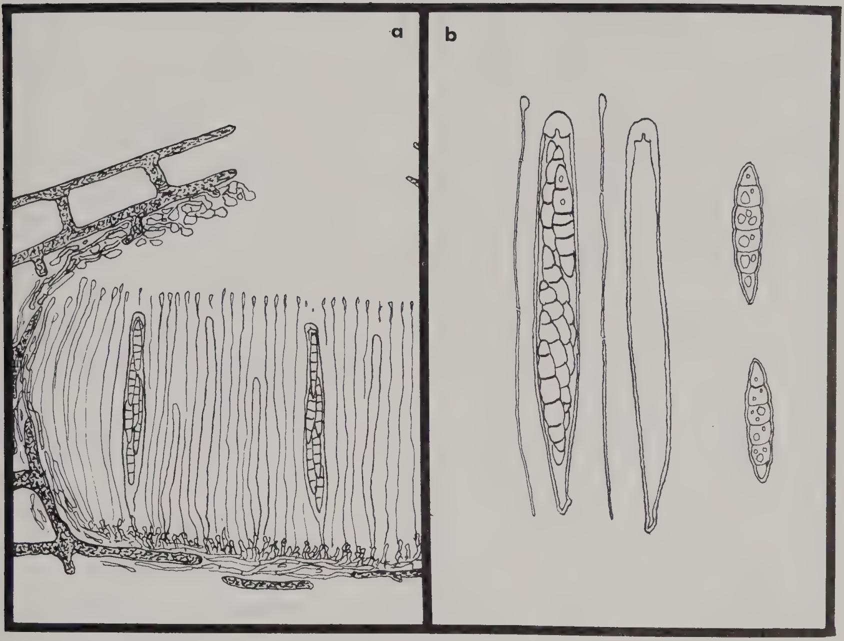

FIGURE 27. *Cryptodiscus pumilus*. a. Cross section of apothecium, x375. b. Asci, paraphyses, and spores, x750. Drawn from the holotype.

SPECIMEN EXAMINED: See holotype, above.

(6). CRYPTODISCUS SPERATUS Sherwood, spec. nov.

Figure 28

Ascocarpi primum immersi, profunde cupulati, 0.15-0.3 mm diam., margine integro, albo, disco pallide ochraceo. Margo in sectione transversali 20 µm crassus, siccus ab hymenio se non abrumpens, ex hyphis intertextis achromis constans. Paraphyses filiformes, simplices vel ramosae, 80 x 1.0 µm, apice ad 1.5 µm incrassatae, achromae, in iodo non caerulescentes. Asci 70-80 x 5-6 µm, apice 1.5 µm crassi, 8-spori. Sporae 58-70 x 2.0 µm, cellulis 3.5-4.5 µm longis.

HOLOTYPUS: CUP-55526, on wood, Ringwood preserve, Tompkins Co. N.Y., USA, Sherwood, Sept. 16, 1976. ISOTYPUS: Herb. Sherwood 2267.

Apothecia immersed, 0.15-0.3 mm broad, the margin thin, entire, colorless, the disc deeply immersed, pale ochraceous. Margin, in cross section, c. 20 µm thick, undifferentiated, of colorless, tightly-packed hyphae 2.5 µm diam., directed inward (but not periphysoidal) above the level of the asci, not splitting away from the hymenium when dry. Subhymenium 8-10 m thick, of small, colorless, angular cells resting directly on host tissue, J-. Paraphyses filiform, 1.0 µm thick, enlarged to 1.5 µm at the knoblike tips, often

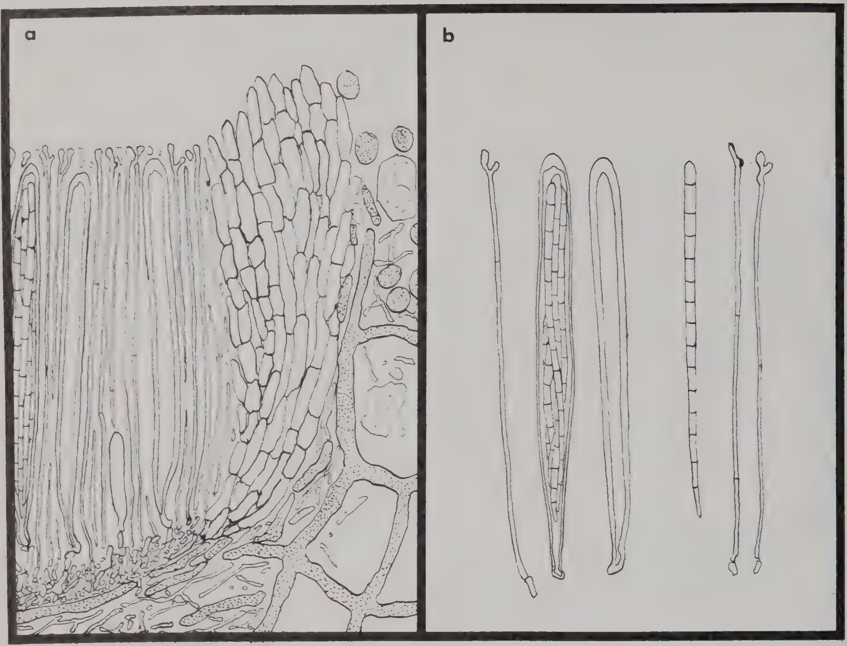

FIGURE 28: *Cryptodiscus speratus*. a. Cross section of margin, x750. b. Asci, paraphyses, and spores, x750. Drawn from the holotype.

branched. Asci 70-80 x 5-6 µm, thick-walled when young, the cap 1.5 µm thick. Spores 8, 58-70 x 2.0 µm, tapering evenly to an acuminate base, transversely multiseptate, the cells 3.5-4.5 µm long.

On dead wood, New York. The structure of this species is clearly that of a *Cryptodiscus*, despite the filiform spores. I chose the epithet *speratus* (expected) because an earlier version of this manuscript stated that filiform spores were unknown in *Cryptodiscus*, but might be expected to occur there.

SPECIMEN EXAMINED: See holotype, above.

(70). *ROBERGEA* Desm., Ann. Sci. Nat. Bot., sér. 3, 8: 177 (1847)

Holotype species: *Robergea unica* Desm., l.c.
= *Tuberculostoma* Sollm.
= *Cyanospora* Heald & Wolf
= *Scoliocarpon* Nyl., Mém. Soc. Acad. Maine Loire 4: 81 (1858)

Apothecia immersed, not becoming erumpent although sometimes exposed in elevated pseudostromatic warts by erosion of the surrounding substrate, taller than broad, lying at a definite angle to the surface of the host, opening by a pore or transverse slit. Margin poorly differentiated except in the region of the pore, of dark, interwoven hyphae, lined with scant, poorly-differentiated periphysoids. Crystalline layer present, or margin containing scattered crystalline inclusions. Hymenium splitting away from the margin when dry. Paraphyses numerous, filiform, usually simple, not forming an epithecium. Asci very long-cylindrical, with a distinct apical cap, J-. Ascospores filiform, colorless, transversely multiseptate.

On wood and bark, Europe, North America, Africa, India? With the exception of *R. albicedrae*, the species are rare and inconspicuous, and little is known of their distribution. The geometry of the fruitbody is best appreciated by reference to the illustrations.

The distinction between *Robergea* and *Ostropa* on the one hand and *Stictis* on the other is far from clearcut if species other than the type are considered. *Stictis dicksoniae*, with deeply-immersed, elongate, vertical ascocarps, and *R. canariense* are both transitional between typical *Stictis* and typical *Robergea*. *Robergea obliqua*, with barely elongate ascocarps lying at a high angle to the substrate and opening by a slit subtended by thick, black lips, is transitional to *Ostropa*. As with *Conotrema*, we are dealing with a very old generic name typified by a species with many distinctive characters; it would seem pointless to submerge *Robergea* in *Ostropa* or *Stictis*, only to have the name revived in an emended sense.

The species are listed below in alphabetical order.

(1). ROBERGEA ALBICEDRAE (Heald & Wolf) Sacc. & Trav., Syll. Fung. 20: 695 (1911)
≡ *Cyanospora albicedrae* Heald & Wolf, Mycologia 2: 209 (1910)

Figure 29

Apothecia immersed in bark and decorticated wood, at first visible as a minute, white-rimmed pore or slit in the surface of the substrate, but later, as uncolonized substrate erodes, immersed in protruding tubercles of partially stromatized wood. The tubercles are 2-3 mm long and may contain more than one apothecium. Apothecia 1.5 mm long, 0.5 mm broad, lying parallel to the surface of the substrate, with a short bent neck at one end. Margin, in the lower part, 15-20 µm thick, of brown interwoven hyphae 2.0 µm diam., the upper third lined with scant, colorless, matted periphysoids 30 x 1.5 µm, these forming a definite layer in the region of the ostiole. The margin surrounding the ostiole is c. 60 µm thick, of tightly-packed brown hyphae 2.0 µm diam., with multiple layers of abundant crystals, gradually merging with the surrounding stromatized and crystal-packed wood. Paraphyses numerous, filiform, 1.0 µm thick, sometimes branched near the apex, J-. Asci 650-1000 x 7-8(-10) µm, the cap 8 µm thick, pierced by a narrow pore. Spores 8, 600-800 x 2.0 µm, the cells 3-5 µm long.

On wood and bark of *Juniperus ashei*, Texas and Mexico. Common. According to Heald and Wolf (l.c.), the common name of the host, mountain white cedar, is the result of whitening of the bark by the activities of this fungus.

In this and other species of *Robergea* the length of asci

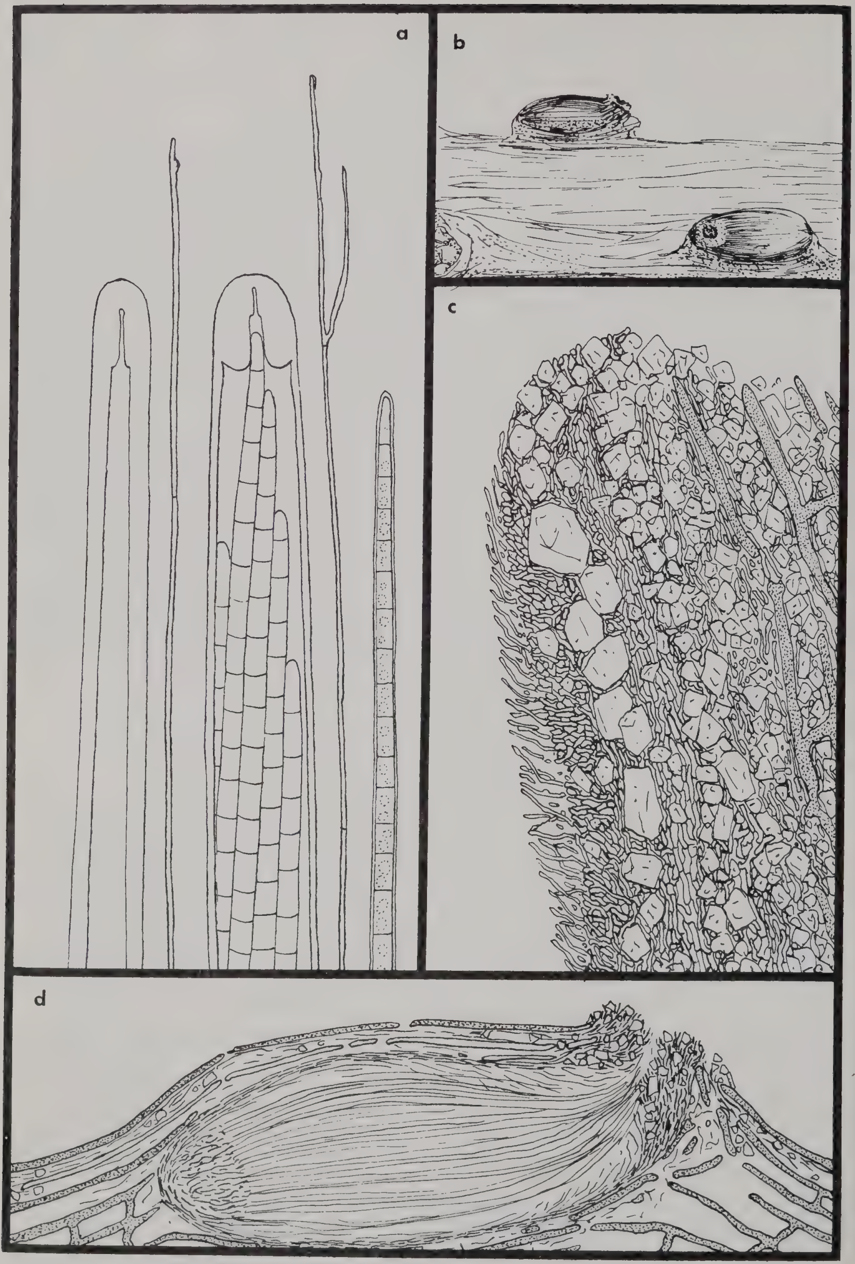

FIGURE 29. *Robergea albicedrae*. a. Detail of apices of asci, paraphyses, and spores, x1500. b. Habit sketch, x7.5. c. Detail of margin at the ostiole, x375. d. Cross section of apothecium, x37.5. Drawn from CUP-53527.

containing septate spores is extremely variable. The spores coil when actively discharged from the asci, but do not seem to do so in microscopic preparations from dried material. The generic name *Cyanospora* was based on Heald and Wolf's claim that the spores were green, apparently an error.

SPECIMENS EXAMINED: NORTH AMERICA: USA (CUP 3861, on *Juniperus ashei (as J. sabinoides)*, Texas, Heald & Wolf, 17.VI.1909 [isotype? No specimen is mentioned in the original description; 53527, *ibid.*, R. T. Jackson, 4.XII.1974) (Herb. Sherwood 2024, on *Juniperus*, Texas, T. Jurik, VI.1975)

(2). ROBERGEA ALBIFRONS Tulasne & Tulasne, Sel. Carp. Fung. 2: 256 (1863)

Fruitbodies immersed in blackened stromatized areas on bleached and decorticated wood of *Salix*, 1-2 mm long, less than 0.5 mm broad, lying parallel to the surface of the substrate, with a short neck at one end, opening by a transverse slit. Asci a little shorter than the fruitbody, less than 10 µm broad. Ascospores 8, nearly as long as the asci, 3.5 µm broad. Pycnidia or spermagonia small, dark-walled, with a globose or sinuous cavity containing colorless rod-shaped spores 2-4 x 1.0 µm, occurring in the stromatized areas along with the ascigerous stage.

The above description is taken from Tulasne and Tulasne (l.c.). I received no answer to my inquiry to PC for the type specimen. *R. albifrons* may well be distinct from *R. cubicularis*, which has narrower spores and does not seem to have an associated pycnidial stage.

(3). ROBERGEA CANARIENSE Sherwood, Spec. Nov.

Figure 30

Ascocarpi immersi, insuperficie hospitis velut discus griseus rima transversali dehiscens visibiles, 0.25-0.4 mm lati, 0.6 mm longi, ad angulam 60° prae superficie substrati positi. Margo in sectione transversali 100 µm crassus, siccus ab hymenio se abrumpens, hypharum pariete 1.5 µm diam., brunneo. Stratum crystallinum 60 µm crassum. Periphysoidea 20 x 1.0 µm, ramosa. Paraphyses filiformes, ramosae, 550 x 1.0 m, apice ad 1.5 µm incrassatae, achromae, in iodo non caerulescentes. Asci 500-525 x 7(-9) µm, apice 9 µm crassi, 8-spori. Sporae 500 x 2.0 µm, cellulis 4-5 µm longis.

HOLOTYPUS: CUP-MM 637, Canary Islands, La Palma, Los Tilos, R. P. Korf, W.C. Denison, L.M. Kohn & M.A. Sherwood, 14.I.1976.

Apothecia entirely immersed in small decorticate twigs, not becoming erumpent, visible on the surface of the host as a grey-pruinose disc 0.3-0.4 mm diam., typically opening by a transverse slit, sometimes by a pore, 0.6 mm tall, lying at an angle of 60° to the surface of the substrate, the wall dark, continuing beneath the hymenium, c. 15 µm thick in the lower part, of dark, non-carbonized hyphae 1.5 µm diam.; Margin in the region of the ostiole c. 100 µm thick. Crystalline layer distinct. Periphysoids colorless, branched, 20 x 1.0 µm, forming a distinct layer in the

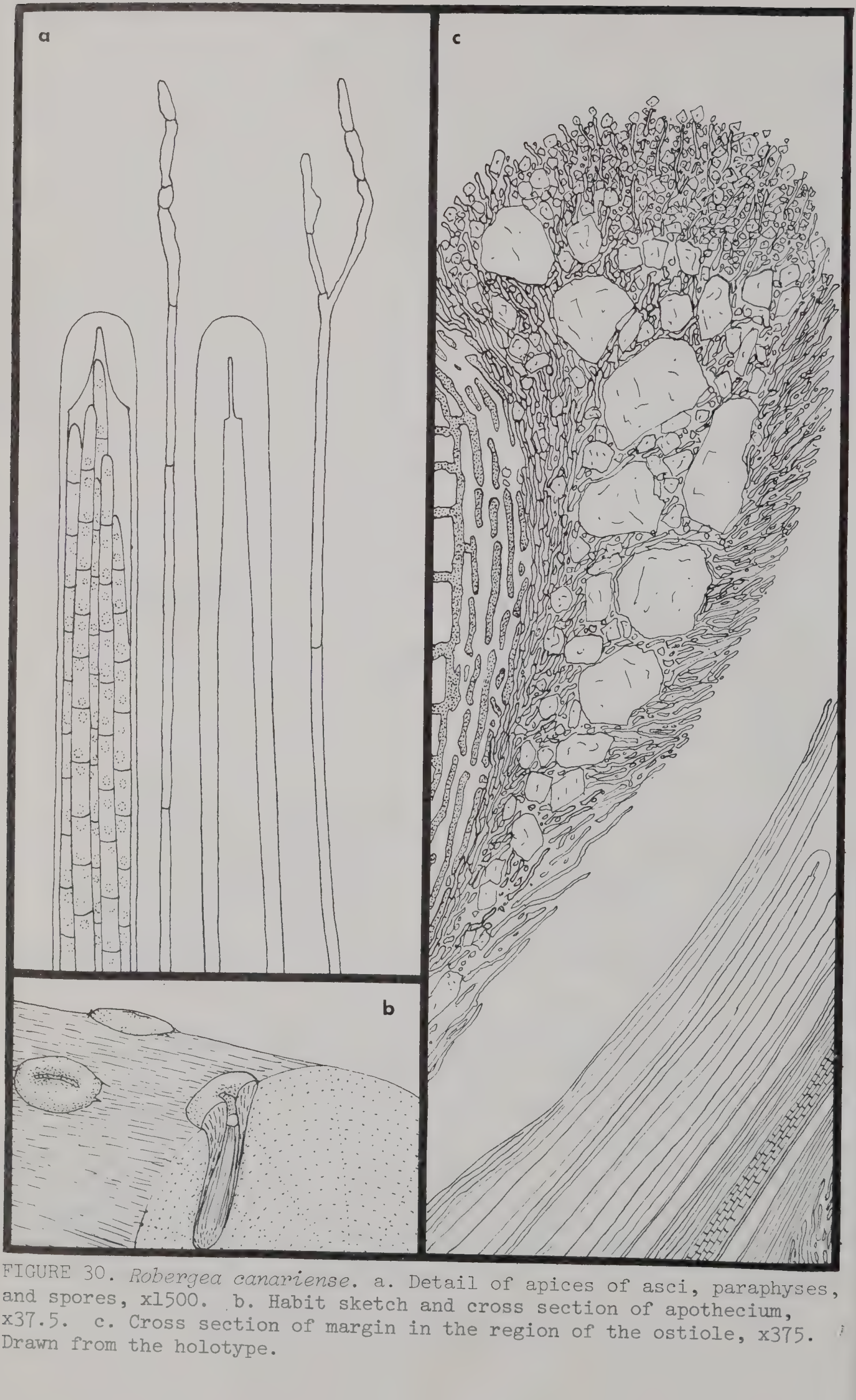

FIGURE 30. *Robergea canariense*. a. Detail of apices of asci, paraphyses, and spores, x1500. b. Habit sketch and cross section of apothecium, x37.5. c. Cross section of margin in the region of the ostiole, x375. Drawn from the holotype.

upper part of the margin. Paraphyses numerous, filiform, 1.0 μm diam., enlarged to 1.5-2.0 μm at the apex, often branched, J-, colorless. Asci 500-525 x 7(-9) μm, the cap 9 μm thick, pierced by a broad, conical pore. Ascospores 8, nearly as long as the asci, 2.0 μm broad, tapering somewhat below, colorless, the cells 4-5 μm long.

On dead twigs of *Myrica* and undetermined decorticated wood, Canary Islands. This species is transitional to *Stictis* sect. *Cyclostoma*.

SPECIMENS EXAMINED (see also holotype, above): AFRICA: Canary Islands (CUP-MM 631; 633 [both from La Palma]; MM-1105, Tenerife)

(4). *ROBERGEA CUBICULARIS* (Fr.) Rehm, Ber. Bayer. Bot. Ges. 13: 163 (1912)
≡ *Sphaeria cubicularis* Fr., Syst. Mycol. 2(2): 477 (1823)
= *Robergea unica* Desm., Ann. Sci. Nat. Bot., sér. 3, 8: 177 (1847)
= *Sphaeria lagenaeforme* Sollm., Bot. Zeitung (Berlin) 20: 380 (1862)
  ≡ *Tuberculostoma lagenaeforme* (Sollm.) Sollm., Hedwigia 3: 116 (1864)
= *Stictis compressa* Ell. & Ev., J. Mycol. 7: 131 (1892)
Figure 31

Apothecia immersed in wood beneath the bark of corticate twigs, not associated with a stromatic tubercle or shield, 2.0-2.5 mm long, c. 300 μm broad, lying parallel to the surface of the substrate, with a short neck at one end protruding through the bark, visible on the surface of the bark as a white-pruinose disc 0.25 mm diam., with a black center, opening by a transverse slit.

Wall, in the lower part of the fruitbody, 15-20 μm thick, of closely-packed, non-carbonized hyphae 1.5 μm diam., becoming 120 μm thick and 3-layered in the region of the ostiole, with a prominent crystalline layer and numerous long, matted, colorless periphysoids 1.0 μm diam. Paraphyses numerous, filiform, 1.0 μm broad, not inflated or branched, colorless, J-. Asci 1300-2000 x 8(-10) μm, the cap 4.0 μm thick, pierced by a broad pore. Ascospores 8, nearly as long as the asci, 1.5(-2) μm broad, the cells 4-6 μm long.

On small, corticate twigs, Europe and North America. Apparently rare. Rehm (1887-96), and Dennis (1968) state that the spores are 600 μm long; all of the specimens I examined had much longer spores. Ellis and Everhart (l.c.) misinterpreted the geometry of the species they described as *Stictis compressa*.

SPECIMENS EXAMINED: EUROPE: Germany (CUP-Herbier Barbey-Boissier 969, on *Fraxinus* and *Syringa*, Nassau, Fuckel). Belgium? (FH-Patouillard, on *Ptelea*, 9.II.1846, isotype of *Robergea unica*). NORTH AMERICA: Canada (CUP-D-2087, on *Carpinus*, Ontario, Dearness; D-2449, Dearness 627, Ontario; D-7605, Dearness, on *Carpinus*, Ontario, 1891, isotype of *Stictis compressa;* D-7607, on *Ostrya*, Ontario, Dearness; D-9360, Ellis & Everhart, North American Fungi 2913, on *Ostrya*, Ontario)

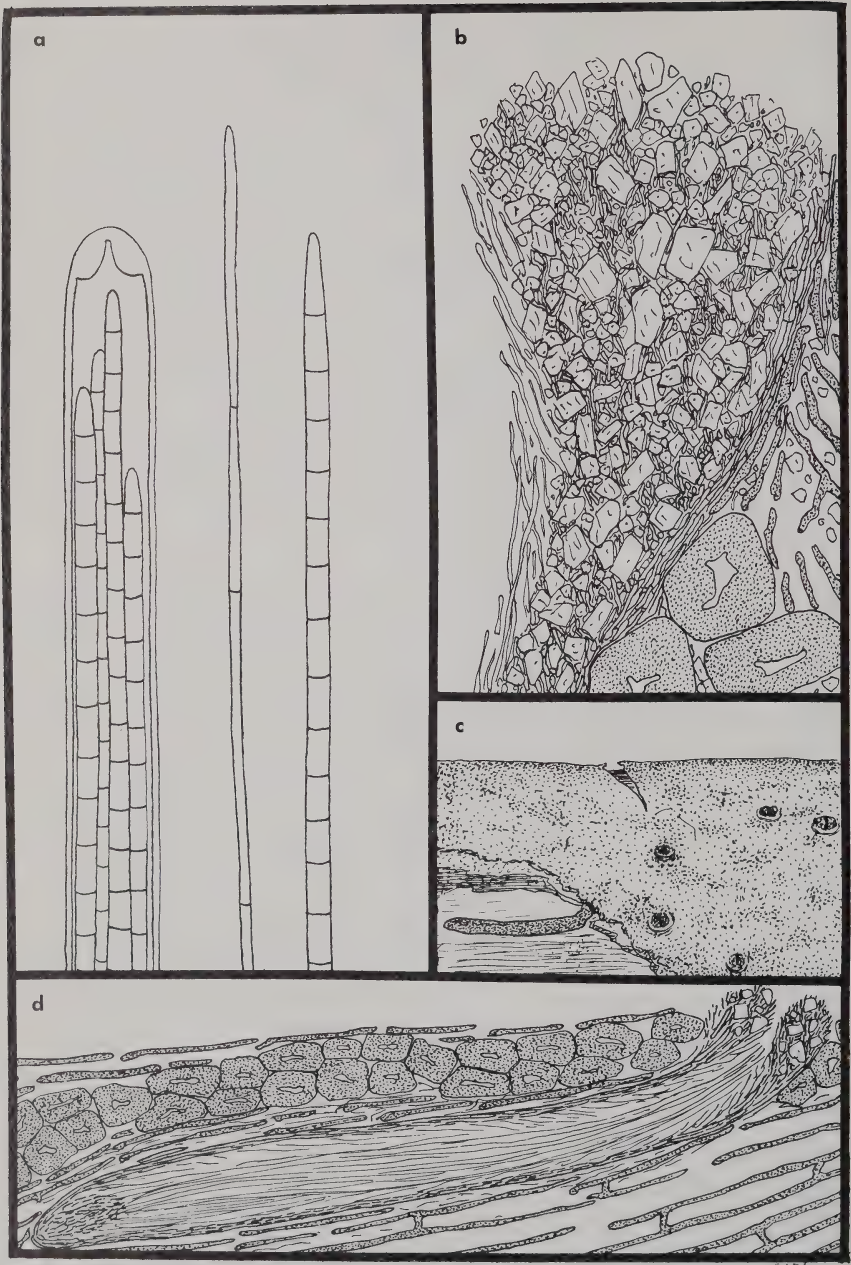

FIGURE 31. *Robergea cubicularis*. a. Detail of apices of ascus, paraphysis, and spores, x1500. b. Detail of margin in the region of the ostiole, x375. c. Habit sketch, x7.5. d. Cross section of ascocarp, x37.5. Drawn from Ell. & Ev., North American Fungi 2913 (CUP).

(5). (ROBERGEA INDICA) Tilak & Kale, Sydowia 24: 85 "1970" (1971)

According to the description this species has apothecia 225-300 µm high and 300-375 µm broad, with a flat hymenium and asci which measure 180-190 x 5-7 µm. Neither the description nor the illustration suggests that this is a *Robergea;* it may be a *Stictis* with a dark margin. No place of deposition is indicated for the type specimen and the authors have not answered my inquiries concerning it.

(6). (ROBERGEA MARATHWADENSIS) Tilak & Srinivasulu, Sydowia 24: 99 "1970" (1971)

I have seen no examples of this species, and the original description will not serve to characterize it.

(7). ROBERGEA NIGRA Sherwood, spec. nov.

Figure 32

Ascocarpi immersi, in superficie hospitis velut discus griseus poro dehiscens visibiles, 0.15 mm lati, 1.2-1.5 mm longi, ad angulam 15° superficie substrati positi. Margo in sectione transversali 50 µm crassus, siccus ab hymenio se abrumpens, hypharum pariete 2.0-2.5 µm diam., brunneo. Stratum crystallinum abest. Paraphyses filiformes, simplices, 1200 x 1.0 µm, in iodo non caerulescentes. Asci 500-1000 x 6-7 µm, apice 6 µm crassi, 8-spori. Sporae 500-1000 x 1.5 µm, cellulis 4-7 µm longis.

HOLOTYPUS: CUP-53110, on *Lonicera involucrata,* Devil's Punchbowl State Park, Lincoln Co., Oregon, USA, M. A. Sherwood, 10.VI.1973. ISOTYPI: OSC. Herb. Sherwood 1008.

Ascocarps immersed in bleached and decorticate twigs, visible on the surface of the substrate as ovate stromatized patches whose long axis is parallel to the grain of the wood, lying at approximately a 15° angle to the surface of the substrate, with a short neck at one end, opening by a black disc c. 120 µm broad. Wall 15 µm thick in the lower part, of interwoven hyphae 2.0-2.5 µm diam., Margin surrounding the ostiole c. 50 µm thick, lined with long, matted, colorless periphysoids 1.0 µm diam., lacking a distinct crystalline layer, but with a few imbedded crystals. Paraphyses simple, colorless, filiform, 1.0 µm diam., barely enlarged above, J-. Asci 500-1000 x 6-7 µm, the cap 6.0 µm thick, pierced by a narrow pore. Ascospores 8, nearly as long as the asci, 1.5 µm broad, the cells 4-7 µm long.

On *Lonicera*, on the west coast of North America. *R. nigra* is distinguished from *R. cubicularis* by the absence of a well-defined crystalline layer, the presence of a distinct stromatic clypeus surrounding the ostiole, shorter asci, and rather broader wall hyphae.

SPECIMENS EXAMINED (see also holotype, above): NORTH AMERICA: USA (Herb. Sherwood 2010, on *Lonicera,* Oregon, 21.VIII.1975)

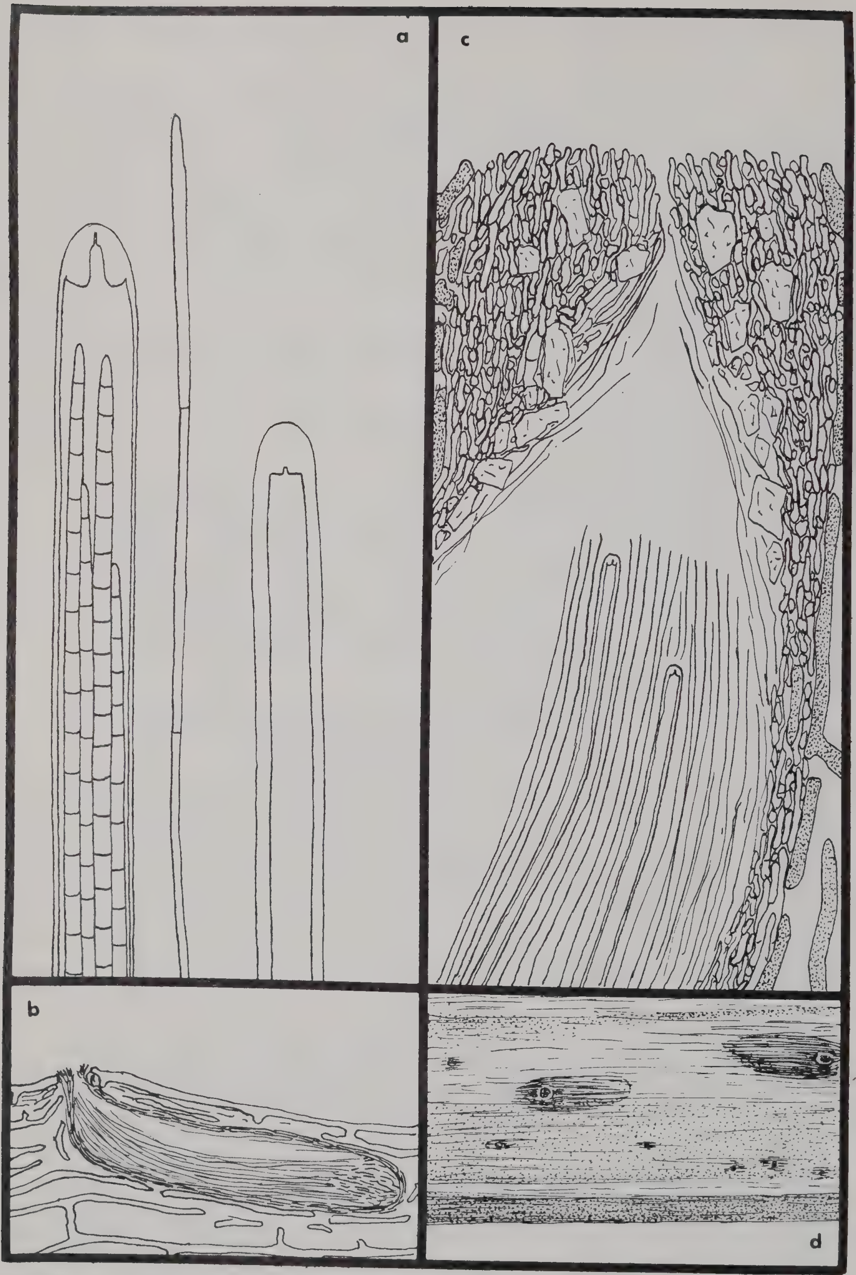

FIGURE 32. *Robergea nigra*. a. Detail of apices of asci, paraphysis, and spores, x1500. b. Cross section of ascocarp, x37.5. c. Detail of margin in the region of the ostiole, x375. d. Habit sketch, x7.5. Drawn from the holotype.

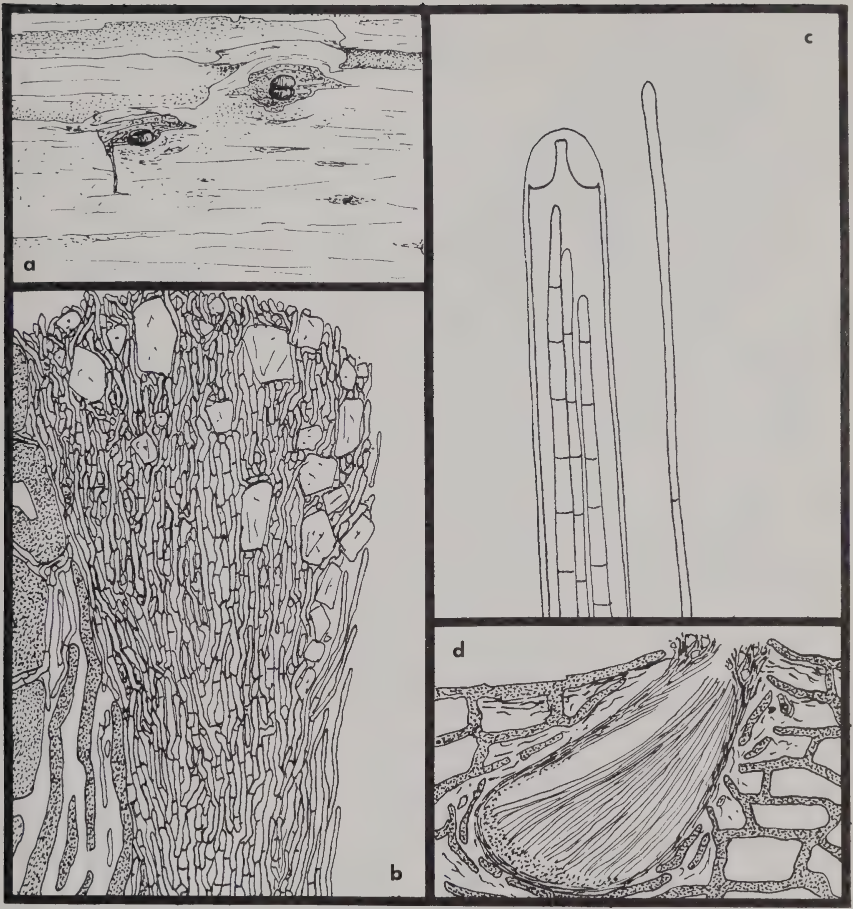

FIGURE 33. *Robergea obliqua.* a. Habit sketch, x7.5. b. Cross section of margin in the region of the ostiole, x375. c. Detail of apices of ascus, paraphysis, and spores, x1500. d. Cross section of apothecium, x75. Drawn from the holotype.

(8). ROBERGEA OBLIQUA Sherwood, spec. nov.

Figure 33

Ascocarpi immersi, in superficie hospitis velut discus niger rima transversali dehiscens visibiles, 0.2 mm lati, 0.5-0.6 mm longi, ad angulam 45° prae superficie substrati positi. Margo in sectione transversali 120 µm crassus, siccus ab hymenio se abrumpens, hypharum pariete 2.0-2.5 µm diam., brunneo. Stratum crystallinum abest. Paraphyses filiformes, simplices, 550 x 1.0 µm, in iodo non caerulescentes. Asci 500-550 x 7 (-8) µm, apice 5 m crassi, 8-spori. Sporae 500 x 1.5-2.0 µm, cellulis 5-7 µm longis.

HOLOTYPUS: CUP-Fairman 619 (18-55), "on dead stems of *Pentstemon cordifolia*", Avalon Canyon, Santa Catalina Island, California, USA. L. W. Nuttall, 18.VII.1920. ISOTYPUS: CUP-Fairman 619 (18-56)

Apothecia immersed in ovoid blackened spots on whitened decorticated wood and herbaceous stems, at first appearing as a minute white-rimmed pore on the surface of the substrate, later opening by a slit c. 200 µm long flanked by two stout, shining black lobes, lying at an angle of 45° to the surface of the host, 300-400 µm broad at the base, 200 µm broad at the summit, 550-650 µm tall. Margin thick, black, carbonized in the region of the ostiole, c. 25 µm thick below, of closely-packed brown hyphae 2.0-2.5 µm diam. the lobes 120 µm thick, of hyphae like those of the wall interspersed with a few scattered crystals, lined on the inside by scanty, matted, long, colorless periphysoids 2.0 µm diam. Asci 500-550 x 7(-8) µm, the cap 5 µm thick, pierced by a broad pore. Paraphyses numerous, filiform, 1.0 µm thick, colorless, not branched or inflated, J-. Ascospores 8, about as long as the asci, 1.5-2.0 µm broad, the cells 5-7 µm long.

Pentstemon cordifolia, an herbaceous vine, is the only host listed on the label, but the packet clearly contains two hosts, both bearing *R. obliqua*. The second is wood of a Gymnosperm, probably *Juniperus*. *Robergea obliqua* is transitional between *Robergea* and *Ostropa*. Fairman's report of *Acerbia bacillifera* in Flora of Santa Catalina Island (Millspaugh & Nuttall, 1923) is based on this specimen.

SPECIMENS EXAMINED: see holotype, above.

(9). *ROBERGEA PUPULA* (Nyl.) R. C. Harris, Contr. Univ. Mich Herb. 11(2): 95 (1975)
≡ *Scoliocarpon pupula* Nyl., Mém. Soc. Acad. Maine Loire 4: 81 (1858)

Figure 34

Apothecia scattered in irregular bleached spots on the bark of living trees, immersed in grey pseudostromatic warts, 0.5-0.6 mm long, 0.25 mm diam., lying at an angle of 20-30° to the surface of the substrate and opening at one end by a short neck, visible on the surface as a white-pruinose disc 0.2 mm diam., opening by a transverse slit. Margin, in cross section, c. 40 µm thick except in the region of the ostiole, where it is c. 70 µm thick, of interwoven, closely-packed hyphae 2.0 µm diam., the outer 2-3 rows of cells dark brown, the remainder colorless, lined in the upper third with a compact layer of periphysoids 30-40 x 2.0 µm. Crystalline layer distinct, narrow. Asci 350-380 x 8 (-13) µm, the cap 9 µm thick, pierced by a narrow pore. Paraphyses numerous, filiform, colorless, 1 µm thick, not inflated or branched, J-. Ascospores 8, 170-315 µm, shorter than the asci and somewhat irregularly 4-seriate, 3.0-3.5 µm broad, the cells 2.5-5.0 µm long; ascospores readily breaking up at pre-formed constrictions into 3 or 4 multiseptate part-spores.

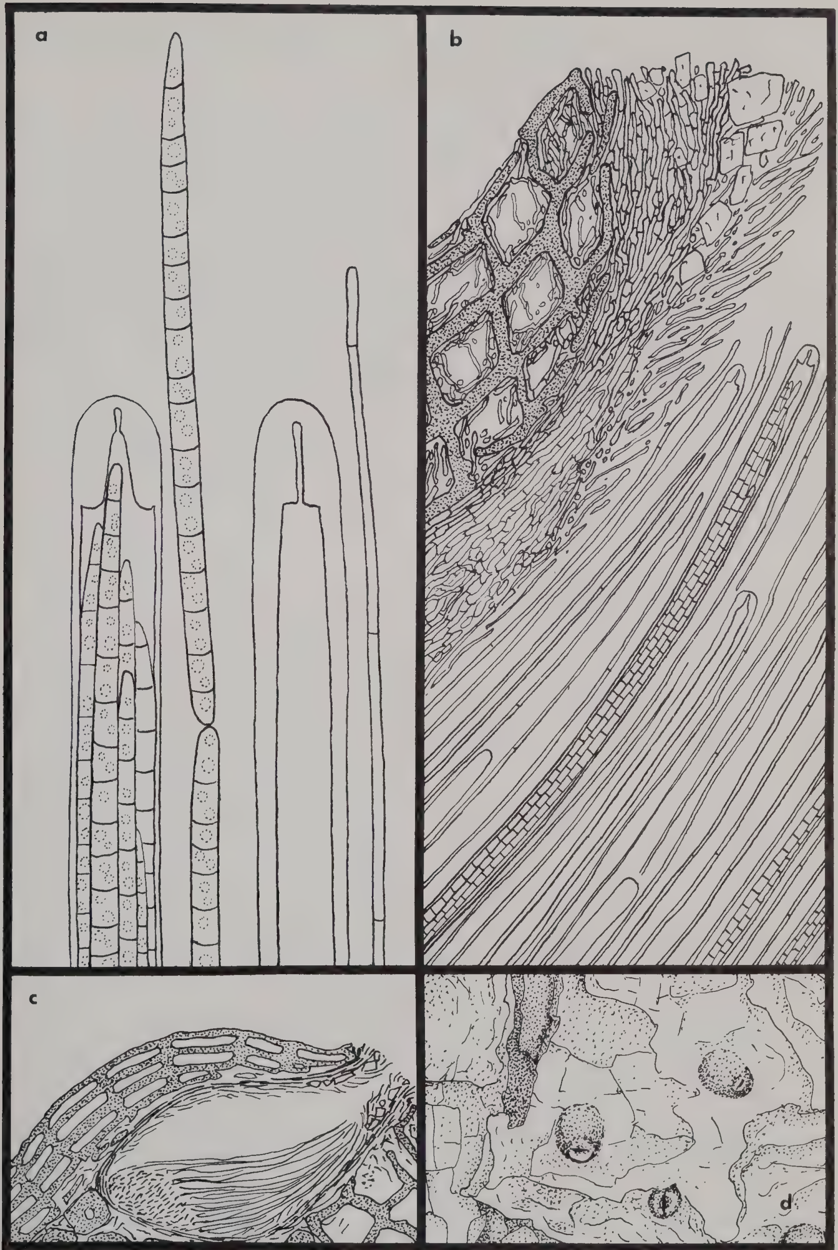

FIGURE 34. *Robergea pupula*. a. Detail of apices of asci, paraphysis, and spores, x1500. b. Cross section of margin in the region of the ostiole, x375. c. Cross section of apothecium, x75. d. Habit sketch, x7.5. Drawn from CUP 54843.

On bark of living trees, southeastern USA. Originally described as a lichen. Details of distribution and additional synonyms are given by Harris (l.c.)

SPECIMEN EXAMINED: NORTH AMERICA: USA (CUP 54843, Kentucky, W. R. Buck B35, 15.V.1975, ex herb. R. C. Harris)

(10). *ROBERGEA SINGULARIS* (Duby ex Rehm) Rehm, Hedwigia 25: 140 (1886)
≡ *Ostropa cinerea* (Pers.) Fr. var. *singularis* Duby in herb.

Described by Rehm as having linear apothecia 1-2 mm long, gregarious in grey elevations on decorticated wood of *Rhus typhina*, with an inconspicuous ostiole and asci 600-700 x 7-8 µm, *Robergea singularis* may well be a *Robergea*. No material of this species is deposited in Rehm's herbarium (S) (R. Santesson, *personal communication*).

(72). *SCHIZOXYLON* Pers., Ann. Wetterauischen Ges. Gesammte Naturk. 2: 11 (1810)

Holotype species: *Schizoxylon sepincola* Pers., l.c.
≡ *Cycledium* Wallr.
= *Sphaerolina* Fckl.
= *Agyriella* Ell. & Ev.
  ≡ *Agyriopsis* Sacc. & Sydow
  ≡ *Bisbyella* Boedijn

Apothecia at first immersed in decaying wood or herbaceous plant material, consisting of a pseudostromatic mass in which the products of fertilization and the hyphae accessory to them give rise to an immersed to erumpent, apothecioid fruitbody consisting of asci, paraphyses, and a margin of matted and interwoven marginal paraphyses surrounded by undifferentiated remnants of pseudostroma. Fruitbody tough, woody, carbonaceous, or fleshy-cartilaginous, long-persistent, containing asci which mature over a period of weeks or months. Periphysoids absent. Hymenial disc shallowly cupulate, plane, or somewhat raised above the level of the margin, not splitting away from the margin when dry. Asci long-cylindrical, sometimes becoming saccate when mature, very thick-walled when young, J-, with a thickened apex pierced by a broad pore, or without any distinct apical apparatus. Ascospores 4 or 8, cylindrical or filiform, transversely multiseptate, colorless, often disarticulating into unicellular or septate part-spores. Paraphyses numerous, variously ramified and pigmented, often 1-2-times branched near the apex, apically thickened, and brown, J+ or J-. The margin may be pruinose or epruinose, colorless, yellow, or brown, but is never pseudoparenchymatous, periphysogenous, or traversed by distinct crystalline layers.

Persoon (1810) erected *Schizoxylon*, which he considered to be a genus of crustose lichens, included one species, *S. sepincola*, occurring on bleached fir timbers in a fence and characterized by erumpent, urceolate, emarginate, coriaceous fruitbodies, and suggested that the affinities of the genus were with *Calicium* Pers. (presumably sessile forms now referred to *Cyphelium* Ach.) and *Verrucaria* Scop.

The first validating author was apparently Chevallier, who included one species, *S. sepincola*. Fries (1822) did not discuss this allegedly lichenized genus, but provided (1825) a generic diagnosis, without mentioning any species. Schweinitz (1832) described a second species, *S. tuberculatum*, from North America.

None of the above authors included microscopic observations in their treatments. Durieu and Léveillé (Bory & Durieu, 1850) were apparently the first to illustrate the cylindical asci and filiform disarticulating spores of *Schizoxylon;* these characters were included by Montagne (1856) in an emended description of the genus. Tulasne and Tulasne (1865) examined specimens in Mérat's herbarium and provided a detailed description of both the pycnidial and ascigerous fructifications of *S. sepincola*. *S. sepincola* was issued by Mougeot and Nestler as Stirpes Cryptogamae Vogeso-Rhenani #174 in 1815.

Early authors who examined *S. sepincola* seem to have agreed that they were dealing with an Ascomycete with filiform, disarticulating spores. The sole specimen filed under this name in Persoon's herbarium (L) is a crustose lichen with obovate, brown, 3-5-septate spores and bitunicate asci, collected in Guadeloupe and annotated in handwriting other than Persoon's. This cannot be the holotype, which was collected near Paris, and would make a poor choice of neotype. A specimen in the Liège herbarium (LG), sine coll., annotated *Schizoxylon sepincola* in Persoon's handwriting, is in poor condition and contains no spores, but seems to conform to current usage of the name and may well be type material. Two specimens from "herb. Richard" now included with Patouillard's collections at FH may conceivably represent type material. One is labelled *"Schizoxylon sepincola* Pers. ad ligna fabrefacta abietina ad sepes destinata", and is correctly identified. The other, which is also *S. sepincola*, but has unusually large apothecia, is labelled *"Schizoxylon majusculum* Richard", and is accompanied by a handwritten description of "*Schizoxylon* Richard", with a protologue corresponding roughly to that of *Schizoxylon* Pers., and references to the mycological writings of Tode and Hedwig (but not Persoon). The relationship between the manuscript name and the published name is a mystery.

As treated here, *Schizoxylon* is distinguished from *Stictis* primarily by the lack of periphysoids. Nannfeldt (1932) considered the distinction between the two genera to be hazy, which is indeed the case if disarticulating spores (Saccardo, 1889; Nannfeldt, 1932), a brown margin (Korf, 1973), superficial growth habit (Dennis, 1963?: no other explanation for the transfer of *Stictis friabilis*, with a colorless margin and non-disarticulating spores, to *Schizoxylon* is given), or branched paraphyses (Rehm, 1887-96) are used as generic characters. Periphysoids give a much more reliable separation Specimens are frequently encountered which on the basis of their erumpent habit, non-periphysoidal margin, and thick epithecium of branched paraphyses, should be placed in *Schizoxylon,* but whose spores do not disarticulate. Immaturity is the most obvious explanation, but I have seen no specimen of *S. albo-atrum*, a common species, in which the spores showed any tendency to fall apart at the septa.

Of necessity I have limited the scope of the present study to the species of *Schizoxylon* reported to occur in North America. In addition, several key European species, the species originally included in *Stictis*, and a few extralimital taxa which were sent to me for identification, and seem from comparison with the literature to be unambiguously new, are described or redescribed here and included in the key.

At present, *Schizoxylon* is poorly represented in major herbaria, perhaps because the species are genuinely rare, perhaps because most are inconspicuous and seldom collected, or because lack of a satisfactory delimitation of the genus has led to misidentification of specimens at the generic level. It would be desirable to have more representative, and better-sorted collections before attempting a worldwide treatment of the genus. A partial treatment is provided here in order to assist in the identification of some of the commoner species and to clarify the characters of the genus.

Key to North American and Selected Extralimital Species of *Schizoxylon*

1. Part-spores 4-seriate or less than 4-seriate in the mature ascus (immature asci 4-spored or spores much shorter than the ascus (2)
1'. Ascospores and part-spores more than 4-seriate in the ascus (Asci 8-spored; spores nearly as long as the asci) (5)
    2(1). Part-spores globose, 3.5-5 µm diam. *(Schizoxylon juniperinum)**
    2'(1). Part-spores cylindrical (3)
3(2'). Part-spores 5-7 µm broad. *(S. crassisporum)*
3'(2'). Part-spores 3-3.5 µm broad (4)
    4(3'). Marginal hyphae brown. Margin not exceeding 75 µm in thickness. *S. compositum*
    4'(3'). Marginal hyphae colorless. Margin 200-300 µm broad. *(S. crassum)*
5(1'). Ascospores not disarticulating; asci more than 250 µm long, with a distinct apical cap. (6)
5'(1'). Ascospores regularly disarticulating into simple or septate part spores; asci usually less than 200 µm long, the apical cap distinct or not. (11)
6(5). Marginal hyphae brown (7)
6'(5). Marginal hyphae colorless (9)
    7(6). Apothecia white-pruinose or yellow-pruinose. Asci over 300 µm long. (8)
    7'(6). Apothecia black, shining, not pruinose. Asci 250-300 µm long. *(S. lantanae)*
8(7). Ascospores 450-500 x 1.0-1.2 µm. Margin bright yellow. *(S. sulfurinum)*

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* Species enclosed in parentheses are not known to occur in North America

8'(7). Ascospores 350-400 x 1.5-2.0 µm; margin white or grey (if ascospores are 250 x 4-5 µm, go to 11, below) *Schizoxylon albo-atrum*

9(6'). Paraphyses tips brown, J+ or J-. *(S. cordobensis)*

9'(6'). Paraphyses tips colorless, J- (10)

10(9'). Ascospores 300-500 x 2.0 µm, the disc pruinose, plane. *S. melleum*

10'(9'). Ascospores 300-350 x 1.75 µm, the disc epruinose, concave. *(S. bellum)*

11(5'). Asci more than 300 µm long (12)

11'(5'). Asci less than 300 µm long (13)

12(11). Asci 500 µm long; margin black, carbonized. *(S. involutum)*

12'(11). Asci 300 µm long; margin reduced, colorless. *(S. pruiniferum)*

13(11'). Part-spores septate (14)

13'(11'). Part-spores unicellular (16)

14(13). Part-spores 1-septate. *S. berkeleyanum*

14'(13). Part-spores multiseptate (15)

15(14'). Part-spores 3-5-septate. *S. microstomum*

15'(14'). Part-spores 10 or more septate *(S. buriticae)*

16(13'). Asci 15-18 µm broad. Part-spores more than 8-seriate. *(S. nigrellum)*

16'(13'). Asci 6-11 µm broad; part-spores 8-seriate (17)

17(16'). Epithecium intensely J+ blue. *S. berkeleyanum* var?

17'(16'). Epithecium J- (18)

18(17'). Part-spores 3-3.5 µm broad; ascosarps fleshy when moist. *S. ligustri*

18'(17'). Part-spores 2.5 µm broad; ascocarps carbonized, not fleshy. *(S. sepincola).*

Descriptions of Species of Schizoxylon

Species reported from North America, and selected extralimital taxa, are listed below in alphabetical order. Excluded species are enclosed in parentheses.

(1). (SCHIZOXYLON ADUNCUM) Feltg.
= *Stictis polycocca* (Karst.) Karst., q.v.

(2). SCHIZOXYLON ALBO-ATRUM Rehm, Ber. Naturhist. Vereins Augsberg 26: 116 (1881)
= *Stictis hypodermia* Bres., Rev. Mycol. (Toulouse) 13: 21 (1891)

Figure 35

Apothecia at first immersed, becoming erumpent and finally nearly superficial, 0.5-1.0 mm diam., about as tall as broad, gregarious, orbicular in cross section, the margin grey-pruinose, KOH-, the disc shallowly cupulate to plane, black and shining. Margin containing scattered nonrosettiform crystalline inclusions, composed throughout of tightly-interwoven hyphae which are colorless and 1.0 µm in diameter near the base of the apothecium, becoming 1.5 µm

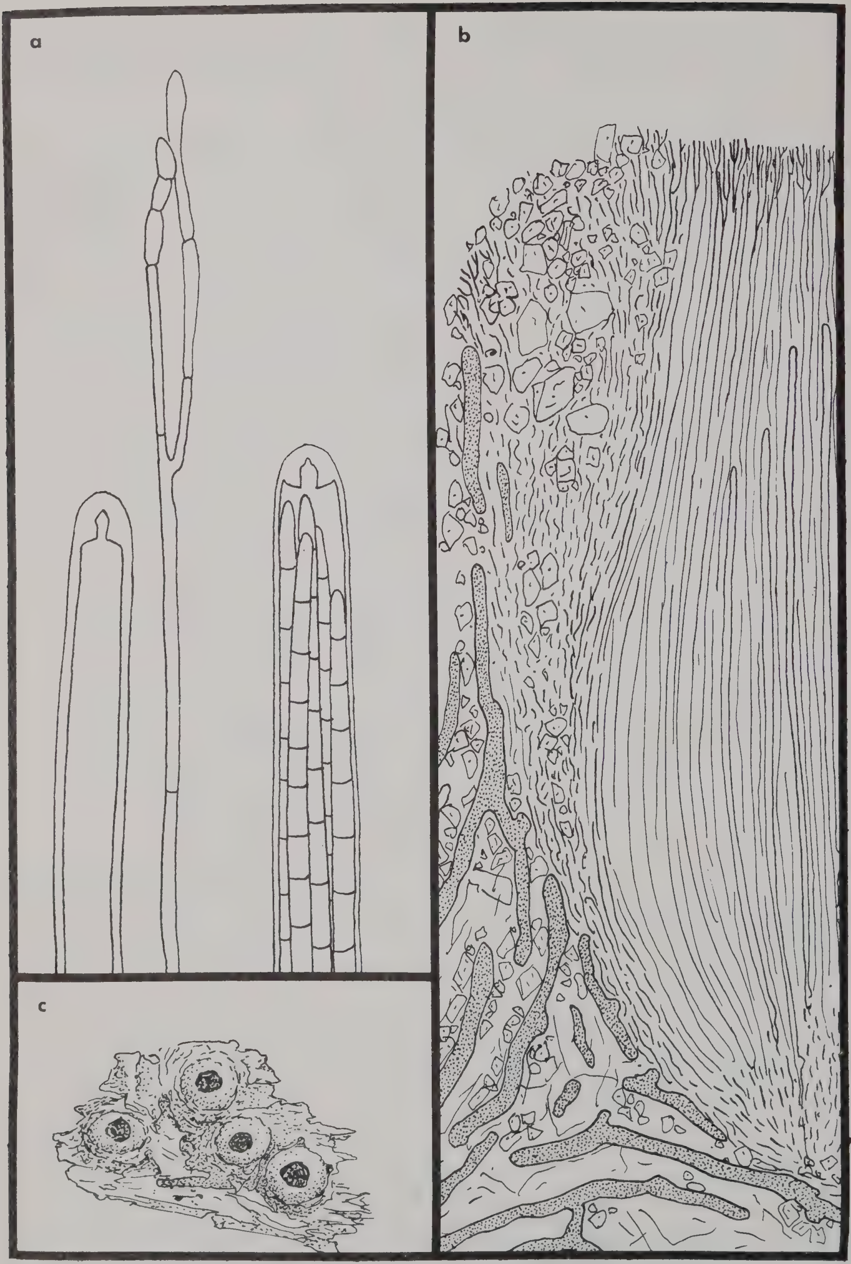

FIGURE 35. *Schizoxylon albo-atrum*. a. Detail of apices of asci, paraphysis, and spores, x1500. b. Cross section of margin, x225. c. Habit sketch, x7.5. Drawn from O-Sommerfeldt 4.1823.

broad and pale brown near the summit, not carbonized. Paraphyses filiform, 1.0 µm broad below, 1-2 times branched and inflated to 2.0 µm at the tip, brown, J- or faintly J+ blue, exceeding the asci by 80 µm and forming a compact epithecium. Asci cylindrical, 350-400 x 7-8 µm, thick-walled when young, with an apical cap 4.0 µm thick pierced by a broad angular pore, J-. Ascospores 8, nearly as long as the asci, colorless, transversely multiseptate, not disarticulating at maturity, the cells 4-5 x 2.0 µm.

On decorticated wood, rarely on bark, Europe and North America. Apparently common. Early authors failed to distinguish between this species and *Stictis mollis*, which often occurs with it. The two fungi are rather similar externally and old specimens of *Sch. albo-atrum* may appear deeply urceolate if the hymenium has disintegrated. Sommerfelt's manuscript name *Sphaeria venusta*, cited by Fries (1828) in his synonymy of *Stictis pupula*, is based on a specimen of *Sch. albo-atrum.*

The specimen from Oregon (Kelmholz 96) has an intensely J+ blue epithecium and a white-pruinose disc; it may well represent a distinct variety.

SPECIMENS EXAMINED: EUROPE: Germany (CUP,NY, on *Tilia,* Rehm, Ascomyceten 478, isotypes of *Schizoxylon albo-atrum*). Norway (O, on *Sorbus*, Sommerfelt; on *Populus,* 4.1823). France (ZT, on *Euonymus,* Müller 3.V.1959). Roumania (NY, on *Pyrus,* Barth, 19.XII.1874). NORTH AMERICA: USA (NY, on *Salix?*, New Jersey, Ellis, 11.I.1892; Ohio, Morgan 1014; Oregon, on *Pyrus,* Kelmholz 96, 3.XII.1932)(CUP-D-10367, Missouri, Durand, 13.III. 1913)

(3). SCHIZOXYLON BELLUM (Cooke & Kalchbrenner) Sherwood, comb. nov.

≡ *Stictis bella* Cke. & Kalchbr., Grevillea 9: 25 (1880)

Figure 36

Apothecia at first immersed, becoming erumpent, 0.5 mm broad, 1.0 mm long, the margin thick, white, entire, KOH-, the disc shallowly cupulate, pale ochraceous, not splitting away from the margin when dry. Margin in cross section 300 µm thick, of loosely interwoven hyphae 1.0 µm diam., imbedded in a gelatinous matrix, colorless. Crystalline inclusions non-rosettiform, numerous in the upper part of the margin. Paraphyses filiform, 1.0 µm diam. below, enlarged to 2.5-3.0 µm above, 1-2 times branched, colorless, J-, forming a distinct epithecium 40 µm thick. Asci 300-350 x 6.0 µm, moderately thick-walled when young, the cap 4.0 - 5.0 µm thick, pierced by a slender pore. Ascospores 8, 300-350 x 1.75 µm, colorless, multiseptate, not disarticulating at the septa, the cells 4-5 µm long.

On branches, south Africa. Known only from the type specimen, which contains four apothecia. The fragmentary material leaves some doubt as to whether the spores remain permanently intact, or whether scattered brown hyphae 4-5 µm diam. which appear in the outer part of the margin are a parasite, remnants of another fungus growing on the same substrate, or rudimentary stromatic margin.

SPECIMEN SEEN: AFRICA: Union of South Africa (K, Kalchbrenner 1288a, Cape, holotype of *Stictis bella*)

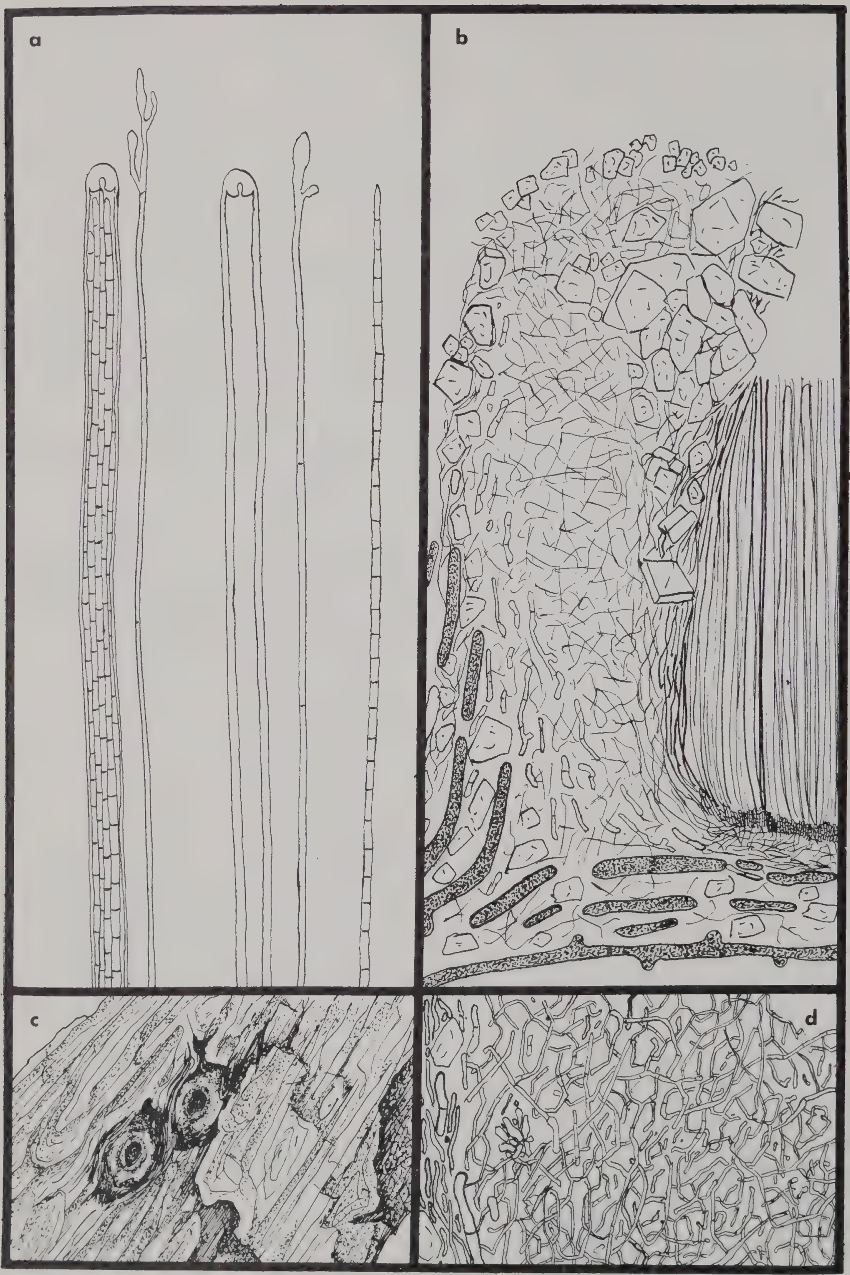

FIGURE 36. *Schizoxylon bellum*. a. Detail of apices of asci, paraphyses, and spores, x750. b. Cross section of margin, x150. c. Habit sketch, x7.5. d. Detail of marginal hyphae, x750. Drawn from the holotype.

(4). SCHIZOXYLON BERKELEYANUM (Dur. & Lév.) Fckl., Jahrb. Nassauischen Vereins Naturk. 23-24: 257 (1870)
≡ *Stictis berkeleyana* Dur. & Lév., Expl. Scientif. Algérie, Atlas t. 89 f. 8 (1850)
≡ *Propolis berkeleyana* (Dur. & Lév.) Desm., Pl. Crypt. Fr. ed. 2, 14 (1853)
≡ *Schmitzomia berkeleyana* (Dur. & Lév.) Phil., Brit. Discom. 379 (1887)
≡ *Cyclostoma berkeleyana* (Dur. & Lév.) Crouan & Crouan, Fl. Finist. 30 (1867)
= *?Sphaerolina xantholeuca* (Fr.) Fckl., Jahrb. Vereins Naturk. Herzogth. Nassau 15: 77 (1860)
  ≡ *Sphaeria xantholeuca* Fr., Syst. Mycol. 2(2): 503 (1823)
= *Rhaphidospora oenotherae* Ausersw. in Rabenh., Fungi Europaei # 823 (1865), nom. nud.
= *Schmitzomia decipiens* Karst., Not. Sällsk. Fauna Fl. Fenn. Förh. 11: 253 (1870)
  ≡ *Stictis decipiens* (Karst.) Cke. & Harkn., Grevillea 9: 8 (1880)
  ≡ *Schizoxylon berkeleyanum* (Dur. & Lév.) Fckl. subsp. *decipiens* (Karst.) Karst., Acta Soc. Fauna Fl. Fenn. 2(6): 165 (1885)
  ≡ *Schizoxylon decipiens* (Karst.) Sacc., Syll. Fung. 8: 697 (1889)
= *Schizoxylon occidentale* Ell. & Ev., J. Mycol. 1: 90 (1885)

Figure 37

Apothecia at first immersed, becoming erumpent and finally nearly superficial, 0.5-1.2 mm diam., varying in shape from discoid to conical, the margin thick, dark, covered with a grey or yellow pruina, KOH+ yellow, the disc dark brown to black, not pruinose. Margin in cross section 80-100 µm thick, of tightly interwoven hyphae 1.5 µm diam., without internal crystalline inclusions but prominently crystalliferous on the outer face. Subhymenium colorless, J-, of small, angular cells, c. 40-50 µm thick. Paraphyses numerous, filiform, 1.0 µm thick below, enlarged to 1.5 µm at the tip which is 1-2 times branched and olivaceous brown. J+ blue, forming an epithecium 30 µm thick. Asci 240-280 x 7-9 µm, thick-walled when young, with an apical cap 2.5 µm thick, pierced by a broad pore, J-. Ascospores 8, 180-200 x 1.5-2.5 µm, soon breaking apart into 1-septate part-spores 5-8 x 1.5-2.5 µm.

On herbaceous plants, rarely on woody plant parts, Europe, North Africa, Pakistan, and North America. In its typical form, a brilliant sulfurous yellow cone surmounted by a small black non-urceolate disc, this species is unmistakeable. This common species is, however, quite variable in external appearance, ranging in color from grey to yellow, and in form from a conical structure resembling a perithecium to an open, discoid fructification. It is easily recognized on microscopic examination by the narrow, 1-septate part-spores.

The source of color variability is unclear; it does not seem to be host mediated, since both forms occur on *Oenothera*. The name *Schizoxylon berkeleyanum* subsp. *decipiens* is available if one wishes to distinguish smaller, more

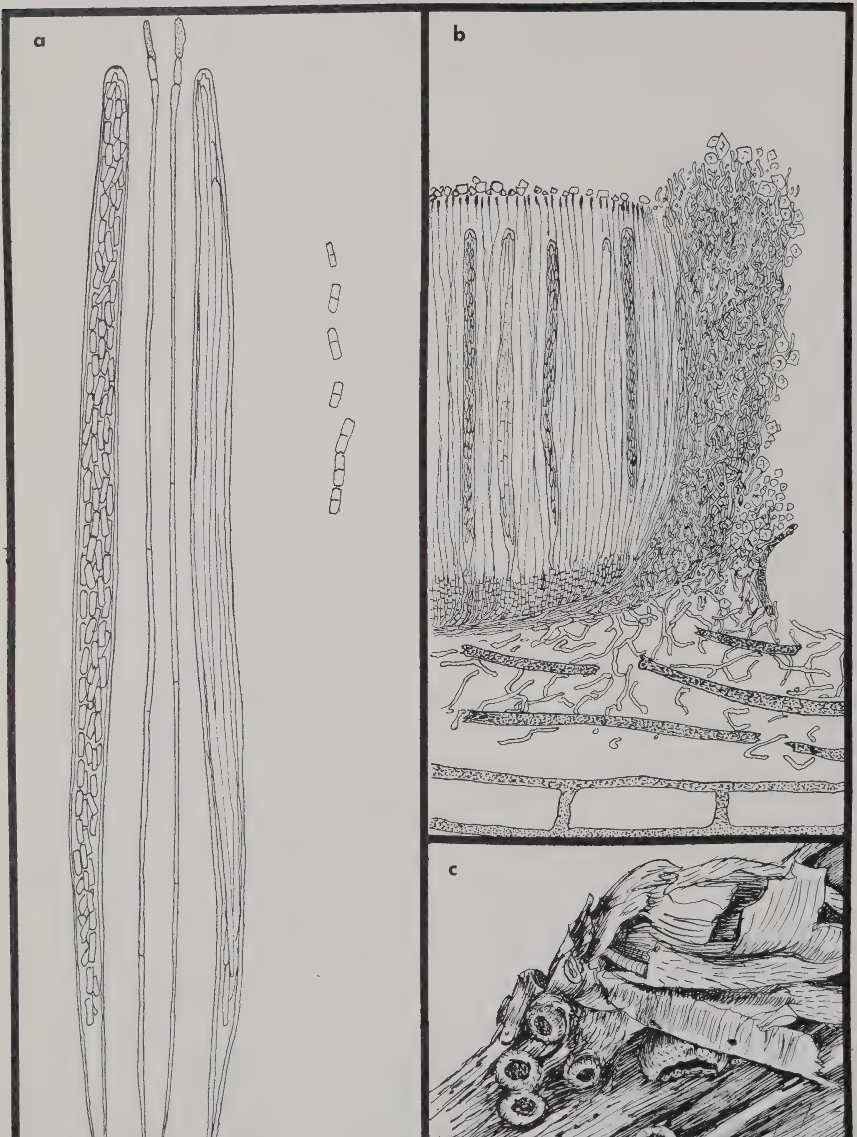

FIGURE 37. *Schizoxylon berkeleyanum*. a. Asci, paraphyses, and part-spores, x750. b. Cross section of apothecium, x225. c. Habit sketch, x7.5. Drawn from Fl. Exs. Austro-Hungarica 3566.

immersed grey forms. The type of *S. decipiens* has septate part-spores. It is apparently rare in North America.

Specimens collected by Brenckle (Fungi Dakotensis 261, 264, and 536) in North Dakota and distributed as *Schizoxylon decipiens* resemble the grey form but have unicellular part-spores. I have seen one European specimen (Mycotheca Marchica 2367) which has unicellular part-spores; it may merely be immature. The grey form is involved in the identity of *Stictis pupula* (q.v.). In the original description of *Schizoxylon occidentale*, Ellis and Everhart state that the spores were 2.5-3.5 μm broad. I could find no spores broader than 2.5 μm broad in the material I examined. The species is otherwise identical to *S. berkeleyanum* subsp. *decipiens*, and has septate part-spores.

SPECIMENS EXAMINED: EUROPE: Austria (CUP, Fl. Exs. Austro-Hungarica 3566, on *Oenothera;* Herb. Barbey-Boissier 1096). Switzerland (NY, on *Oenothera,* Krieger, IV.1880; on *Galium,* Krieger, 1880). Germany (CUP, Rabenh. Fungi Europaei 823, on *Oenothera,* isotype of *Rhaphidospora oenotherae*)(NY, Sydow, Mycotheca Marchica 2367, on *Solidago*). France (NY, Roumeguère, F. Sel. Exs. 5415, on *Epilobium*). Sweden (S, on *Poterium*, Eliasson 66; on *Galium,* Kugelberg, VII.1891)(H, on *Tanacetum*, Karsten 1266)(UPS, Småland, Fries; Östergotland 6/11/1861). Finland (H, on *Corylus*, Karsten 1274; Karsten 1257, sine coll.; Karsten 1256, on *Artemesia,* holotype of *Schmitzomia decipiens*). AFRICA: Algeria (FH-Patouillard 5011, ex herb Durieu, isotype of *Stictis berkeleyana*). ASIA: West Pakistan (ZT 14382). NORTH AMERICA: USA (NY-Brenckle, Fungi Dakotensis 261, 264, 536, all from North Dakota)(CUP-D-7745, Harkness 104, Utah, V.1885, isotype of *Schizoxylon occidentale*)

(5). *SCHIZOXYLON BETHELI* (Ell. & Ev.) Cash
= *Schizoxylon ligustri* (Schw.) Sherwood, q.v.

(6). *(SCHIZOXYLON BICOLOR)* Ell. & Ev.
= *Stictis bicolor* (Ell. & Ev.) Starbäck , q.v.

(7). SCHIZOXYLON BURITICAE Sherwood, spec. nov.

Figure 38

Ascocarpi primum immersi, erumpescentes, non profunde cupulati, 0.8-2.0 mm diam., margine integro, griseo, disco griseo. Margo in sectione transversali 200 μm crassus, siccus ab hymenio se non abrumpens, ex hyphis intertextis brunneis constans. Paraphyses filiformes, 300 x 1.0 μm, apice non incrassatae, ramosae, pallide brunneae, in iodo caerulescentes. Asci 250-300 x 10 μm, apice 5 μm crassi, 8-spori. Spori 250 x 4.5 - 5.0 μm, cellulis 4-5 μm longis, ad septa se disjungentibus et articulos 7-15 septatis formantibus.

HOLOTYPUS: NY-Ec 10, on unidentified twig, ca. 11 km SW of Chillogallo, on the old road from Quito to Santo Domingo, Prov. Pichincha. Elev. ca. 11000'. K. P. Dumont, S.E. Carpenter, & P. Buriticá, 16.VII.1975.

Etymology: Named after one of the collectors.

Ascocarps at first immersed, becoming erumpent, 0.8-2.0 mm diam., orbicular, fleshy when wet, the margin thick, entire, grey-pruinose, the disc shallowly cupulate, grey-

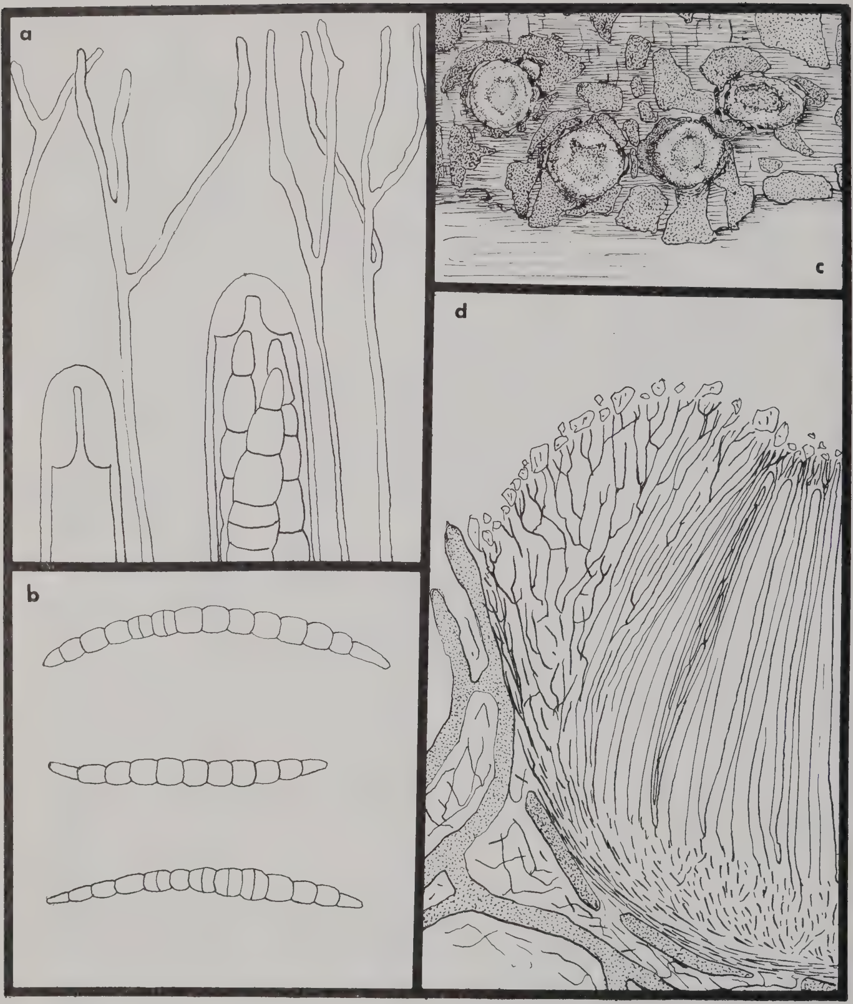

FIGURE 38. *Schizoxylon buriticae.* a. Detail of apices of asci, paraphyses, and spores, x1500. b. Part-spores, x750. c. Habit sketch, x7.5. d. Cross section of margin, x225. Drawn from the holotype.

pruinose, a little darker than the margin, not splitting away from the margin when dry. Margin, in cross section, c. 200 μm broad, composed principally of widely-spaced, interwoven, colorless hyphae 1.5 μm diam., immersed in a gel, the outer face pale brown and crystalliferous. Subhymenium c. 100 μm thick, J-, of small, colorless, angular cells. Paraphyses numerous, filiform, 1.0 μm broad below, apically branched and pale brown, J+ blue, 1.5 μm broad at the apex, exceeding the asci by 10-15 μm, forming an epithecium. Asci 250-300 x 10(-14) μm, the cap 5 μm thick when mature, much thicker when young, J-. Ascospores 8, c. 250 x 4.5-5 μm, with three prominent constrictions, appearing to break up into 4 multiseptate, slightly curved part-spores when mounted for microscopic observation but apparently discharged as a unit in nature, the cells 3-5 µm long.

On small twigs at high elevations, Colombia and Ecuador. The characters of *S. buriticai* do not agree with those of any described species of Schizoxylon. The thick, very gelatinous excipulum and broad, multiseptate part-spores are diagnostic.

SPECIMENS EXAMINED (see also holotype, above): SOUTH AMERICA: Colombia (COL-Co 4369, on twig, Dto. Boyacá, K. P. Dumont, S. E. Carpenter, M.A. Sherwood, L. A. Molina, 10.VI.1976)(NY-Co 5417, on twig, Dto. Cundinamarca, K.P. Dumont, S.E. Carpenter, M.A. Sherwood, A. Gentry, 31.VII.76)

(8). SCHIZOXYLON COMPOSITUM Ell. & Ev., Proc. Acad. Nat. Sci. Philadelphia 10: 353 (1894)
= *Schizoxylon dermateoides* Rehm, Ann. Mycol. 4: 353 (1906)

Figure 39, 44c

Apothecia scattered to gregarious, at first immersed, then erumpent, broadly discoid, 0.8-2.5(-3) mm broad, orbicular to irregular in outline, the disc simple or occasionally divided by sterile bands of crystalliferous paraphyses which give the impression of a compound disc, plane or shallowly cupulate, the margin grey, yellow, or greenish-pruinose, KOH+ yellow-orange, the disc also pruinose, a little darker than the margin, grey, yellow, or olive green. Margin in cross section c. 30 µm thick, of densely-packed, non-gelatinizing pale brown hyphae 1.5-2 µm diam., crystalliferous only on the outer face. Subhymenium c. 30 µm thick, of small colorless cells 2.0 µm diam., faintly brownish below. Paraphysis apices and marginal paraphyses J+ blue. Paraphyses filiform, 1.0 µm diam., 2-3 times branched near the apex which is inflated to 2.5 µm and dark brown, crystalliferous, forming an epithecium 60 µm thick. Asci cylindrical, 200-215 x 10-11 µm, thick-walled when young, without an apical cap, J-, 8-spored. Ascospores 4-seriate and much shorter than the asci, soon falling apart into simple or 1-septate part spores 4-7 x 3.5-4.5 µm.

On wood and bark, North America. Apparently fairly common. This species seems to occur in a bewildering number of forms. Some specimens are distinctly yellow-green and have been identified in herbaria as *Schizoxylon aeruginosum* Fckl. (= *S, ligustri*); others are yellowish-grey or grey, with or without a KOH+ yellowish reaction. Young apothecia have a minute disc and broad margin, and appear nearly pyrenomycetous; as they mature, the disc expands. Specimens with all 0-septate spores 3-3.5 µm broad, or all 1-septate spores 4-4.5 µm broad, have been observed, but both conditions may occur within a single apothecium. Compound apothecia were considered by Ellis (l.c.) and Rehm (in a letter to Ellis) to be an important feature of *S. compositum*. Compound apothecia are found in many Ostropales. They are more common in *S. compositum* than in some species, but may be completely absent in some specimens which are otherwise typical *S. compositum*.

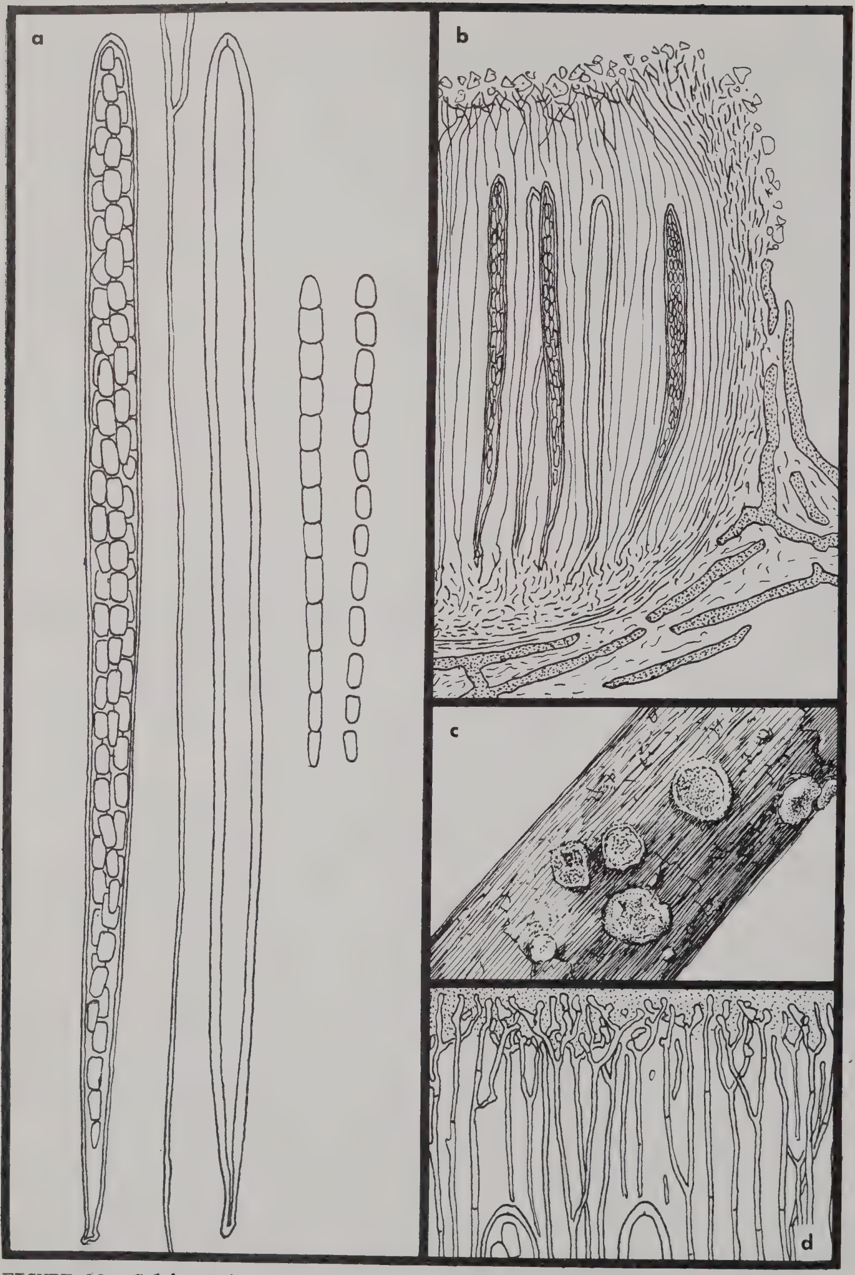

FIGURE 39. *Schizoxylon compositum*. a. Asci, paraphysis, spores, and part-spores, x750. b. Cross section of margin, x225. c. Habit sketch, x7.5. d. Detail of epithecium, x750. Drawn from NY-Bartholomew 1366.

SPECIMENS EXAMINED: NORTH AMERICA; USA (BPI, Underwood & Cooke 552, New York)(NY, on *Symphoricarpus,* Kansas, Bartholomew 1366, lectotype [Designated here] of *Schizoxylon compositum*; New Jersey, Ellis 16.IX.1892, lectoparatype; on *Symphoricarpus,* Kansas, 29.I.1894; North American Fungi 3234, on *Fraxinus*, Kansas; Flora Ludoviciana 2331, on *Boussingaultia,* Louisiana)(CUP-Fairman 1968, New York, isotype of *Schizoxylon dermateoides*; Fairman-3528, on *Carya*, New York; Atkinson, on *Symphoricarpus,* Kansas, 20.III.1894; Atkinson, on *Cornus,* Kansas, 13.XI.1896; Atkinson, on *Populus,* Kansas, 10.IV.1896; Atkinson, on *Salix,* Kansas, 27.III.1896; D-1764, on *Carya*, New York; D-2379, on *Hickoria*, New York; D-10861, Nebraska, III.1893; D-7748, on *Acer,* New York; D-2380, on *Populus,* New York). Canada (CUP-D-7730, on *Crataegus,* Ontario, Dearness 1258; D-7729, on *Salix,* Ontario, Dearness 1258b; D-2465, on *Fraxinus*, Dearness 1488)

(9). SCHIZOXYLON CORDOBENSIS (Spegazzini) Sherwood, comb. nov.
≡ *Stictis cordobensis* Speg., Bol. Acad. Nac. Ci. 29: 162 (1926)

Figure 40

Apothecia at first immersed, opening to expose the broad flat disc but not becoming erumpent, 0.8-1.0 mm broad, with a thick, pale brown, scarcely pruinose margin and darker brown, shallowly cupulate, epruinose disc. Margin in cross section composed throughout of colorless hyphae 1.0-1.5 µm diam., with a few scattered crystalline inclusions, 100 µm or more thick, not splitting away from the hymenium when dry. Paraphyses numerous, filiform, 1.0 µm diam. below, enlarged to 2-3.5 µm at the brown tip, simple or once-branched, exceeding the asci by 10 µm, J+ or J-. Subhymenium colorless, J+ or J-. Asci cylindrical, 400 x 6-8 µm, thick-walled when young, with an apical cap 3.0 µm thick, pierced by a broad pore, J-. Ascospores 8, nearly as long as the asci, 1.75 µm broad, the cells 5-7 µm long, not falling apart at the septa.

On wood, South America. The characters of this species do not correspond to any of Spegazzini's descriptions of *Schizoxylon.* Spegazzini gives the dimensions of the asci as "225-259 x 8 ". I suspect this reflects an error in recording rather than variation within the collection. Measurements of the asci of *Stictis atrata (=Schizoxylon involutum)*, described in the same paper, are also far too short. The Colombian specimens lack the J+ hymenial reaction found in the type and have a grey disc; otherwise they agree with Spegazzini's specimen.

SPECIMENS EXAMINED: SOUTH AMERICA: Argentina (LPS 28235, Córdoba, Bruch 124, holotype of *Stictis cordobensis*). Colombia (CUP-Co-409, Chardon) (NY-Co-4842, Dto. Boyacá, K.P. Dumont, S.E. Carpenter, M.A. Sherwood &L.A. Molina, 11.VI.1976)

(10). SCHIZOXYLON CRASSISPORUM (Spegazzini) Sherwood, comb. nov.
≡ *Stictis crassispora* Speg., Annales Mus. Nac. Hist. Nat. Buenos Aires 23: 102 (1912)

Figure 41

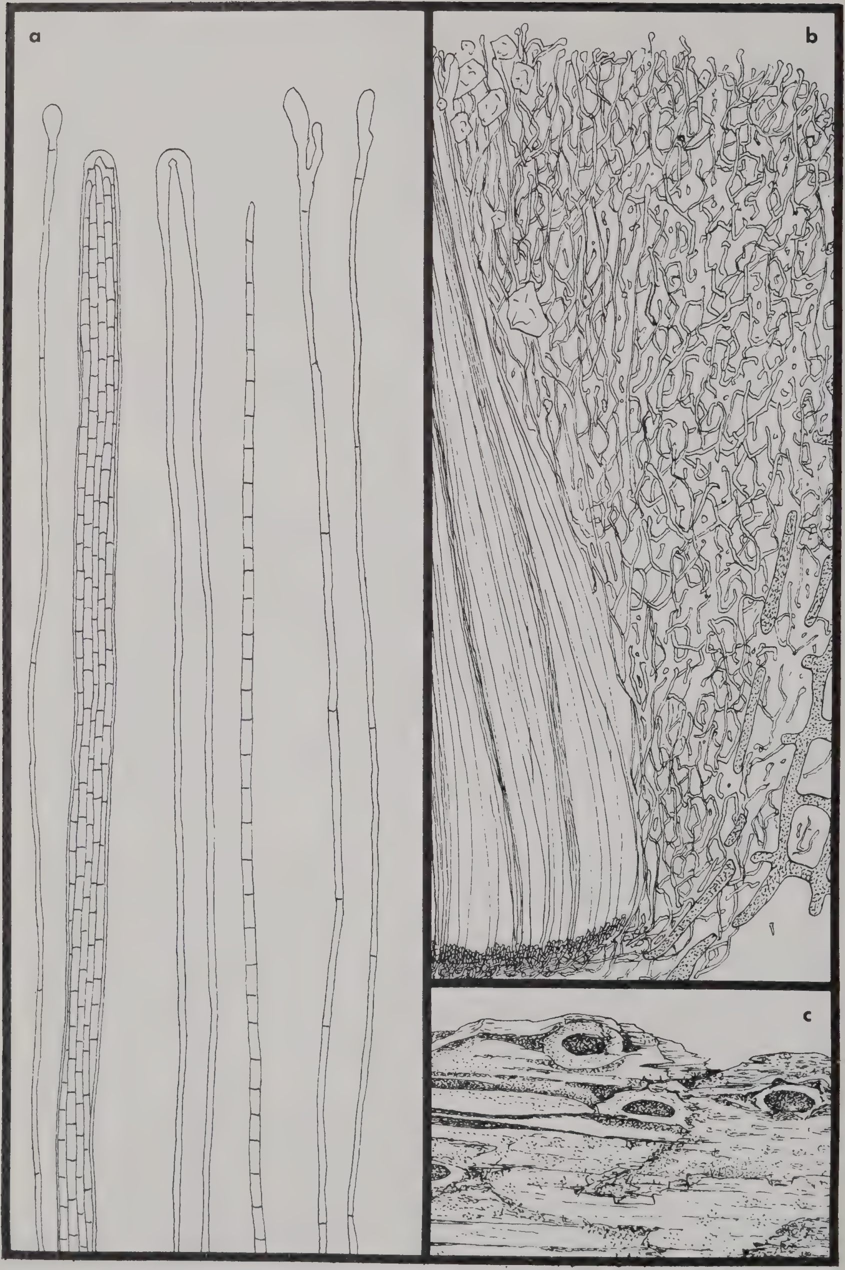

FIGURE 40. *Schizoxylon cordobensis*. a. Detail of apices of asci, paraphyses, and spores, x750. b. Cross section of margin, x300. c. Habit sketch, x7.5. Drawn from the holotype.

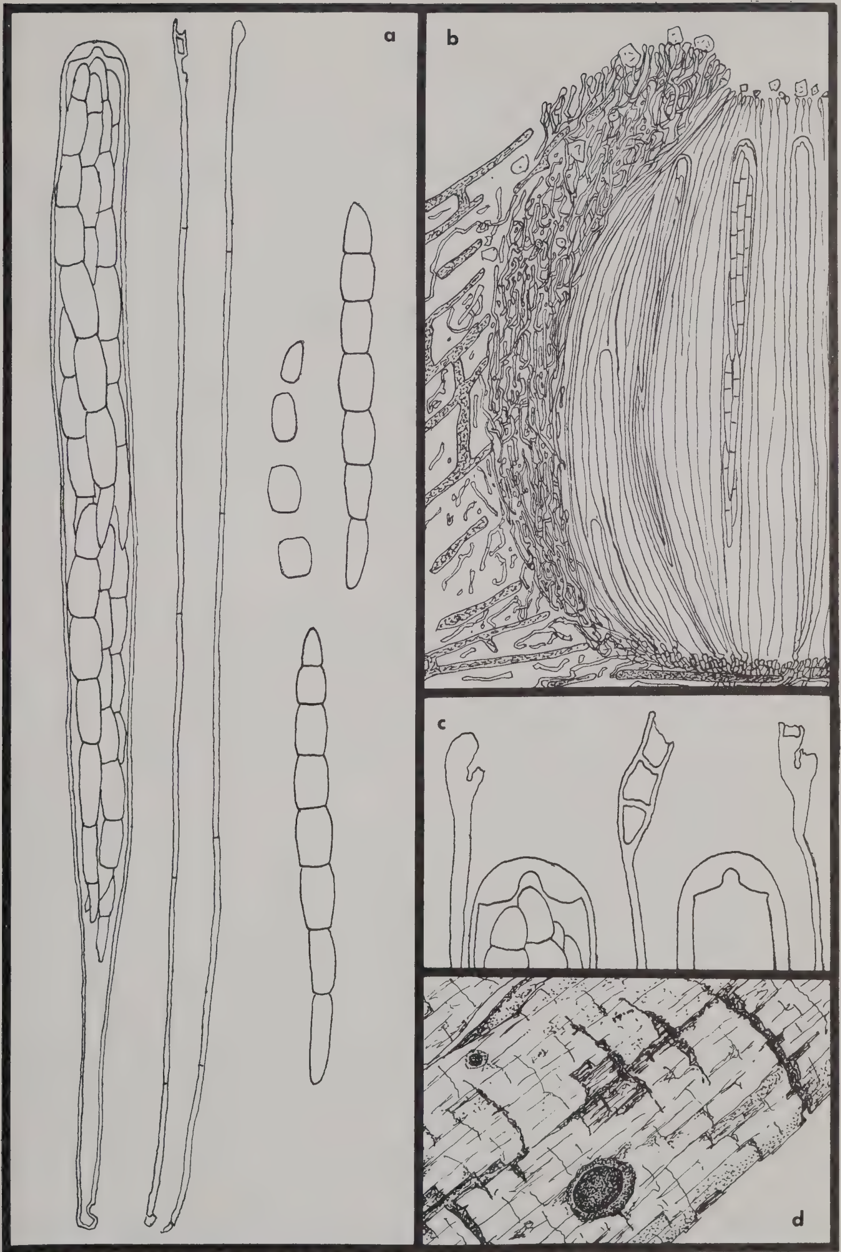

FIGURE 41. *Schizoxylon crassisporum*. a. Ascus, paraphyses, and spores, x750. b. Cross section of margin, x300. c. Detail of apices of asci and paraphyses, x1500. d. Habit sketch, x7.5. Drawn from the holotype.

Apothecia at first immersed, opening to expose the broa flat disc but not becoming erumpent, 0.5-1.2 mm diam., the margin dark brown, white-pruinose, the disc black, greyish pruinose, shallowly cupulate, not splitting away from the margin when dry. Margin in cross section c. 50 µm thick, of interwoven hyphae 1.5 µm diam., dark brown without, hyaline within, containing scattered non-rosettiform crystalline inclusions. Paraphyses numerous, filiform, 1.0 µm diam., inflated to 4.0 µm at the septate brown tip, mostly unbranched, exceeding the asci by 10 µm, J-. Asci 200-215 x 10-12 µm, thick-walled when young, with an indistinct cap 1.5 µm thick, J-. Ascospores 8, 4-seriate, 65-80 (-100, fide Spegazzini) x 5-7 µm, 7-9-septate, constricted at the septa and eventually breaking up into short-cylindrical part-spores.

On decorticated wood, Argentina. Known only from a fragmentary type collection. This species does not correspond to any of Spegazzini's descriptions of *Schizoxylon*.

SPECIMENS EXAMINED: SOUTH AMERICA: Argentina (LPS 38231, on *Tricycla spinosa*, Mendoza, holotype of *Stictis crassispora*)

(11). SCHIZOXYLON CRASSUM Sherwood, spec. nov.

Figure 42

Ascocarpi primum immersi, erumpescentes, non profunde cupulati, 1.5-3.0 mm diam., margine integro, albo, disco brunneo. Margo in sectione transversali 200-300 µm crassus, siccus ab hymenio se non abrumpens, ex hyphis intertextis achromis constans. Paraphyses filiformes, simplices, 600 x 1.0 µm, apice non incrassatae, achromae vel pallide brunneae, in iodo caerulescentes. Asci 200-220 x 5.5-7 µm, apice 3.0 µm crassi- 8-spori. Sporae 100-120 x 3-3.5 µm, cellulis 3-4 µm longis.

HOLOTYPUS: IMI 81239, on bark of *Quercus*, Murree hills, West Pakistan, August, 1955.

Apothecia at first immersed, dissolving the overlying bark and often opening by a slit or triangular fissure, erumpent, orbicular to elongate, 1.5-3.0 mm diam. Margin white-pruinose, thick, involute, nearly covering the pale brown, pruinose, shallowly cupulate disc. Margin in cross section 200-300 µm thick, of loosely interwoven colorless hyphae 1.5 µm diam. interspersed with numerous colorless rosettiform crystals, not splitting away from the hymenium when dry. Subhymenium J+ blue, 50 µm thick, of small, colorless, angular cells. Paraphyses 600 x 1.0 µm, greatly exceeding the asci, simple or once-branched, not enlarged above, the apex brown, J+ blue and crystalliferous. Asci 200-220 x 5.5-7 µm, thick-walled when young, the cap 3.0 µm thick, pierced by a broad pore. Spores 8, 4-seriate, 100-120 x 3.0-3.5 µm, tapering above and below, septate, the cells 3-4 µm long, not disarticulating at the septa.

On bark, Pakistan. This does not fit the description of any known species of *Schizoxylon*, and has no name in *Stictis*. In broken asci the inner wall and outer wall appea separable, although the asci cannot be induced to "jack in

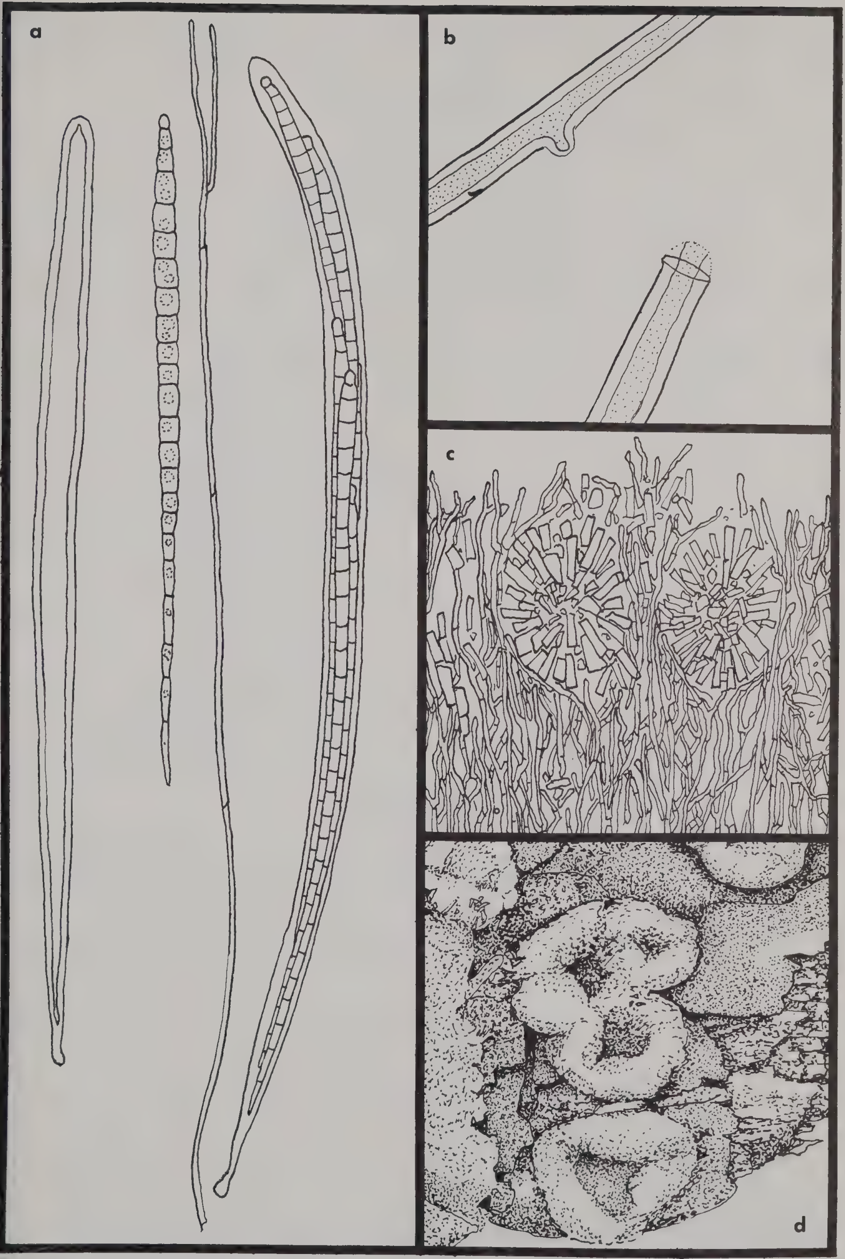

FIGURE 42. *Schizoxylon crassum.* a. Asci, paraphysis, and spores, x750. b. Detail of broken asci, x750. c. Marginal hyphae and rosettiform crystals, x750. d. Habit sketch, x7.5. Drawn from the holotype.

the box" in this dried material. It is difficult to imagine how a discomycete with a massive epithecium and short-stalked asci containing little epiplasm manages to discharge its spores if the asci are not bitunicate.

SPECIMEN SEEN: See holotype, above.

(12). SCHIZOXYLON DECIPIENS (Karst.) Sacc.
≡ *Schizoxylon berkeleyanum* (Dur. & Lév.) Fckl. subsp. *decipiens* (Karst.) Karst., q.v.

(13). SCHIZOXYLON DERMATEOIDES Rehm
= *Schizoxylon compositum* Ellis & Everh., q.v.

(14). SCHIZOXYLON INVOLUTUM Sherwood, nom. nov.
≡ *Stictis atrata* Speg., Bol. Acad. Nac. Ci. 29: 162 (1926) non *S. atrata* Desm. (1845)

Figure 43

Apothecia at first immersed, becoming erumpent, 1.0-1.5 mm diam., the margin thick, shining black, and involute, the disc shallowly cupulate, also black. Margin in cross section 150 μm thick, the outer third of tightly-packed, irregularly nodulose brown hyphae 2-3.5 μm diam., the inner two thirds of loosely interwoven, gelatinizing, colorless hyphae 1.5-2.0 μm diam., with a few inconspicuous crystalline inclusions The quantity of host tissue imbedded in the margin indicates that the early stages are immersed, although the apothecia in the type are all nearly superficial. Paraphyses numerous, filiform, 750 μm long, 1.0 μm diam. below, enlarged to 2-2.5 μm above, J- (J+ according to Spegazzini), once-branched, brown at the tip. Asci 650-700 x 8-9 μm, cylindrical, not thick-walled and without an obvious cap. Ascospores 8, nearly as long as the asci, 1.75 μm broad.

On wood, Argentina. Known only from the type, which contains four apparently immature apothecia. Spegazzini reports the asci as being 220-250 μm long, surely an error. His measurements of spore cells (3-4 μm) and report of J+ asci (probably paraphyses) would seem to indicate that the type once contained mature apothecia. It would be desirable to recollect this species, whose massive, black, involute margin is reminiscent of *Ostropa*.

SPECIMEN SEEN: SOUTH AMERICA: Argentina (LPS 28236, Bruch 130, Córdoba, holotype of *Stictis atrata* Speg.)

(15). SCHIZOXYLON JUNIPERINUM Sherwood, spec. nov.

Figure 44, a-b

Ascocarpi primum immersi, non erumpescentes, non profunde cupulati, 0.3-0.5 mm diam., margine integro, nigro, disco griseo. Margo in sectione transversali 70 μm crassus, siccus ab hymenio se non abrumpens, ex hyphis intertextis brunneis constans. Paraphyses filiformes, ramosae, 250 x 1.0 μm, apice ad 2.0-2.5 μm incrassatae, brunneae, in iodo caerulescentes. Asci 200-220 x 10-11(-20) μm, apice 1.5 μm crassi, 4-spori. Sporae 125 x 3.5-5.0 μm, cellulis 3.5-5.0 μm longis,

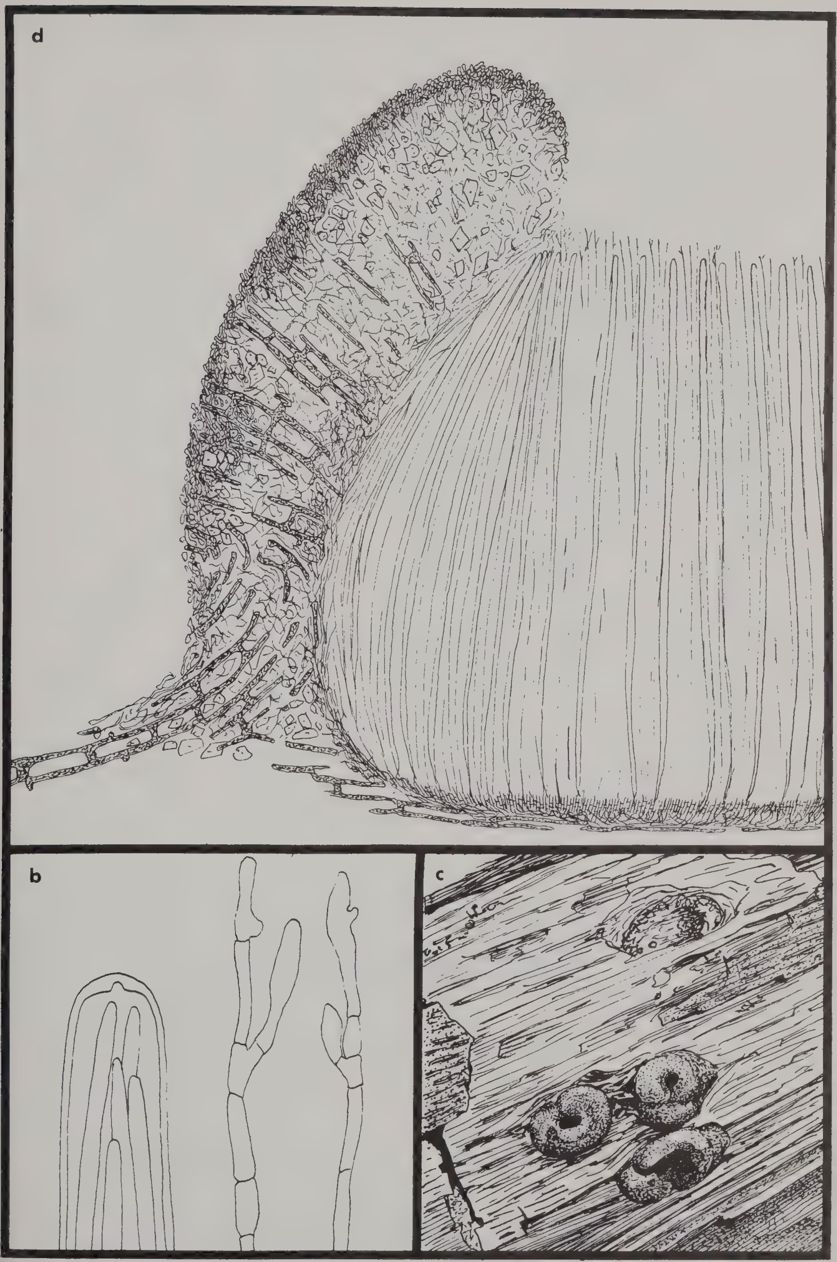

FIGURE 43. *Schizoxylon involutum*. a. Cross section of apothecium, x112.5 b. Apices of ascus and paraphyses, x1500. c. Habit sketch, x7.5. Drawn from the holotype.

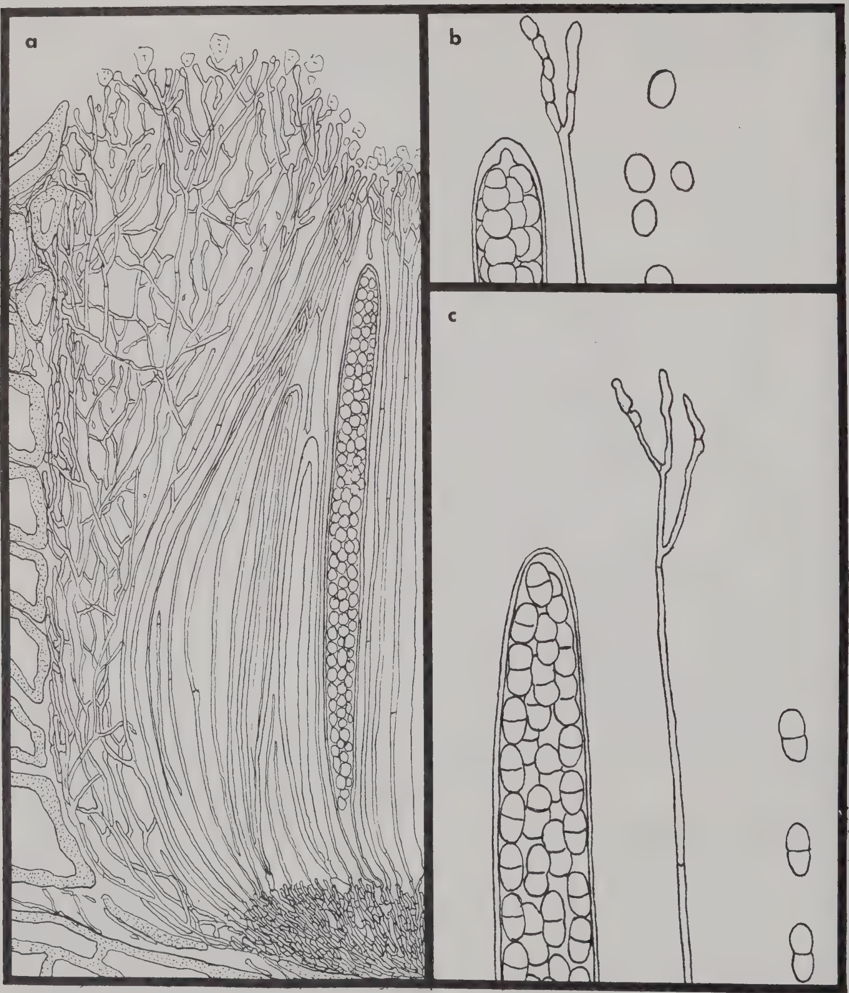

FIGURE 44 . a-b. *Schizoxylon juniperinum*. a. Cross section of ascocarp, x375. b. Detail of apices of an ascus and a paraphysis; part-spores, x750. c. *Schizoxylon compositum*. Ascus, paraphysis, and spores of the form with septate part-spores. a-b drawn from the holotype. c drawn from NY-Fairman 110.

ad septa se disjungentibus et articulos simplices formantibus.

HOLOTYPUS: ZT, Fungi of West Pakistan 15622, on dead branches of of juniper, Ziarat, 26.VI.1962, S. Ahmad.

Apothecia immersed in bleached spots on decorticated wood, 0.3-0.5 mm diam., not becoming erumpent, surrounded by a patch of stromatized wood c. 1mm broad, the margin thin, black, the disc dark grey pruinose. Hypothecium colorless, J-, of cells 1 µm diam. Paraphyses 230 x 1.0 µm, 1-2 times branched, enlarged to 2.0-2.5 µm at the tip, brown, J+ blue. Margin in cross section 70 µm thick, of very loosely interwoven marginal paraphyses 1.0-1.5 µm diam., brown on the exterior face. Paraphyses tips and outer face of the margin slightly crystalliferous. Asci 4-spored (? by abortion), 200-220 x 10-11 µm, becoming saccate and up to 20 µm broad when mature, the cap 1.5 µm thick, indistinct. Ascospores c. 125 x 3.5-5.0 µm, soon breaking up into globose part-spores .

On wood, Pakistan. The broad, globose part-spores are very distinctive and would surely have been mentioned in a description if this species had been described at all recently.

SPECIMEN EXAMINED: See holotype, above.

(16). SCHIZOXYLON LANTANAE (Tilak & Nanir) Sherwood, comb. nov.
≡ *Stictis lantanae* Tilak & Nanir, Rev. Mycol. 39: 119 (1975)
= *Stictis indica* Tilak & Nanir, Rev. Mycol. 39: 120 (1975)

Figure 45

Apothecia at first immersed, opening broadly but not becoming erumpent, 0.5-1.0 mm broad, the disc shallowly cupulate, black, shining, not pruinose, the margin thick, black, shining, somewhat white-pruinose in the part adjoining the hymenium. Immature stages may appear to open by a slit.

Margin, in cross section, 100 µm thick, of widely-spaced hyphae immersed in a gel, these colorless and less than 1.0 µm broad below, branched, somewhat thickened, and brown above. Periphysoids absent; margin not splitting away from the hymenium when dry. Scattered crystalline inclusions are present at the interface between the hymenium and the margin.

Paraphyses numerous, filiform, 1.0 µm broad and colorless below, 1-2 times branched and inflated to 2.0 µm at the tip which is brown and J+ blue, exceeding the asci by 10 µm, forming an epithecium. Spores 8, nearly as long as the asci, 1.5-2.0 µm broad, septate, the cells 3-5 µm long. Asci cylindrical, 250-300 x 7-8 µm, the cap 4.5 µm thick.

On woody plants, India. I have chosen to retain the epithet *lantanae*, rather than the simultaneously published *indica*, because *S. indica* is typified by a specimen in poor condition.

SPECIMENS EXAMINED: ASIA: India (Personal herbarium of S. R. Nanir, on *Lantana*, Aurangabad, May, 1972, holotype of *S. lantanae;* on *Acasia*, Aurangabad, May 1972, holotype of *S. indica*)

(17). SCHIZOXYLON LIGUSTRI (Schweinitz) Sherwood. comb. nov.
≡ *Stictis ligustri* Schw., Trans. Amer. Philos. Soc. n.s. 4: 308 (1832)
= *Schizoxylon aeruginosum* Fckl., Jahrb. Nassauischen Vereins Naturk. 23-24: 251 (1870)

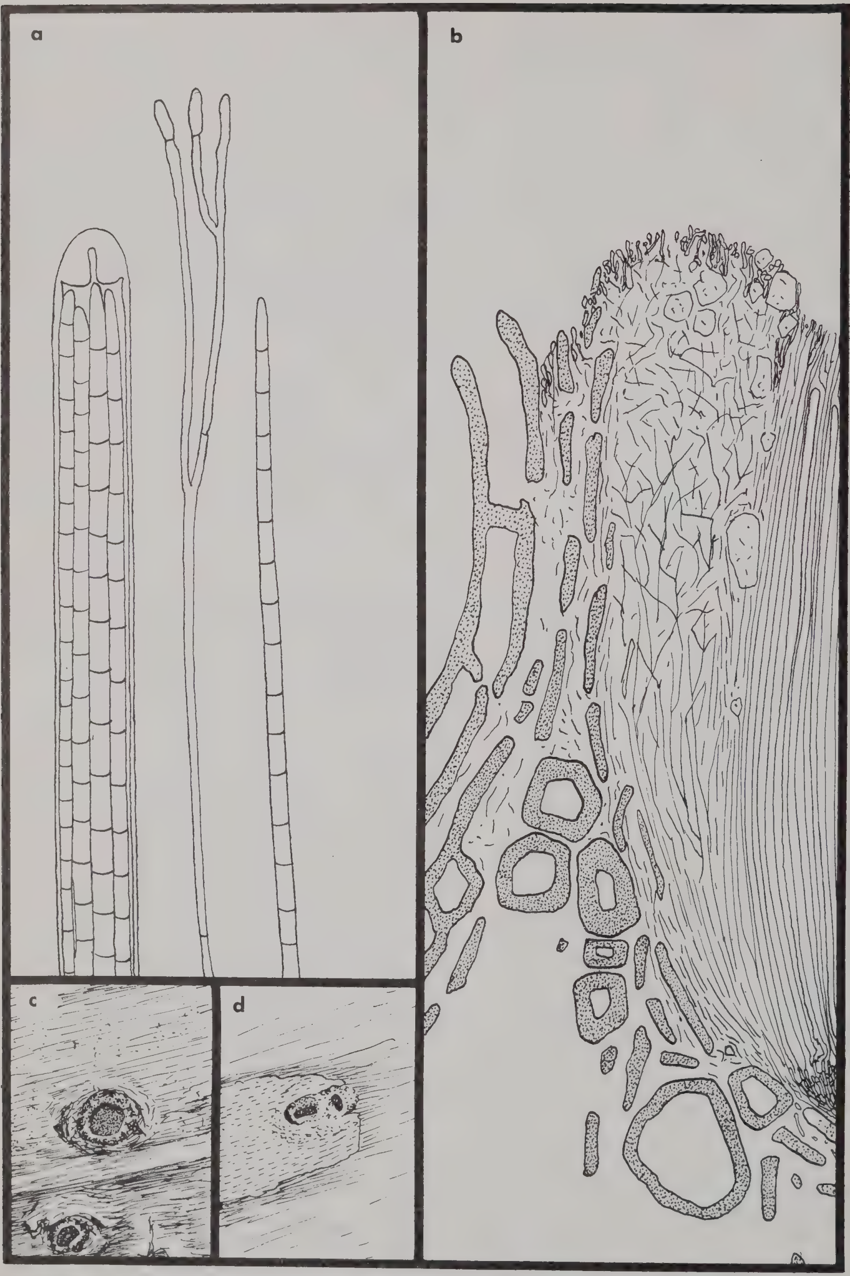

FIGURE 45. *Schizoxylon lantanae.* a. Apices of an ascus, paraphysis, and spores, x1500. b. Cross section of margin, x375. c. Habit sketch of mature apothecia, x7.5. d. Habit sketch of immature apothecia, x7.5. Drawn from the holotype of *S. lantanae.*

= *Stictis glaucoma* Berk. & Curt., Grevillea 4: 7 (1875)
= *Agyriella bethelii* Ell. & Everh., Bull. Torrey Bot. Club 24: 470 (1897)
≡ *Agyriopsis bethelii* (Ell. & Everh.) Sacc. & Sydow, Syll. Fung. 14: 805 (1899)
≡ *Schizoxylon bethelii* (Ell. & Everh.) Cash, Mycologia 35: 600 (1943)

Figure 46

Apothecia at first immersed, opening by a pore, becoming erumpent and at length nearly superficial, with a plane or reflexed margin, more closely resembling a Dermateaceaous than a Stictidaceous fungus to the casual observer, 0.7-1.0 mm broad, fleshy when wet, with a grey disc and white-pruinose margin. Margin in cross section 50 µm thick, of pale brown hyphae 2.0-2.5 µm diam., externally pruinose but without internal crystalline inclusions, not splitting away from the hymenium when dry. Paraphyses numerous, filiform, 1.0 µm diam. below, 1.5-2.0 µm diam. above, brown, usually once-branched, J-, exceeding the asci by 5-10 µm, the epithecium poorly developed compared to most species of *Schizoxylon*. Asci 140-170 x 9-11 µm, very thick-walled when young, the cap 3 µm thick, pierced by a broad pore. Ascospores 8, 100-125 x 2.5-3.5 µm, soon breaking up into short-cylindrical part-spores 3-5 µm long.

On small twigs of a variety of woody plants, Europe and North America. Schweinitz described his species as having yellow or grey apothecia. The yellow apothecia in his type have no hymenium and the naked wood beneath them is responsible for the color. *Schizoxylon aeruginosum* is identical microscopically.

SPECIMENS EXAMINED: EUROPE: Austria (G, on *Rubus caesius*, holotype of *Schizoxylon aeruginosum*). NORTH AMERICA: USA (K, Curtis 105, on *Rosa rubiginosa*, lectotype [designated here] of *Stictis glaucoma*; on *Viburnum*, 2282, South Carolina, lectoparatype of *S. glaucoma*)(PHIL, on *Ligustrum*, Pennsylvania, holotype of *Stictis ligustri*)(NY, on *Bigelovia*, Colorado, Bethel, holotype of *Agyriella bethelii*; on *Abrus*, Shear 77, Florida)(FH, on *Bigelovia*, Colorado, Bethel, isotype of *Agyriella bethelii*)

(18). SCHIZOXYLON MELLEUM (Dearness & House) Sherwood, comb. nov.

≡ *Ostropa mellea* Dearn. & House, New York State Mus. Bull. 266: 67 (1925)

Figure 47

Apothecia at first immersed, becoming partially erumpent, 0.5-0.8 mm diam., with a white-pruinose margin and plane, pale ochraceous disc. Margin in cross section c. 100 µm thick, of loosely interwoven colorless hyphae 1.0-1.5 µm diam., externally with many scattered colorless non-rosettiform crystalline inclusions, internally forming a compact, colorless layer, not splitting away from the hymenium when dry. The margin appears dark because of included host tissue, and was so described by Dearness and House. Paraphyses numerous, filiform, 1.0 µm diam. below, 1-2 times branched above but scarcely enlarged, colorless throughout,

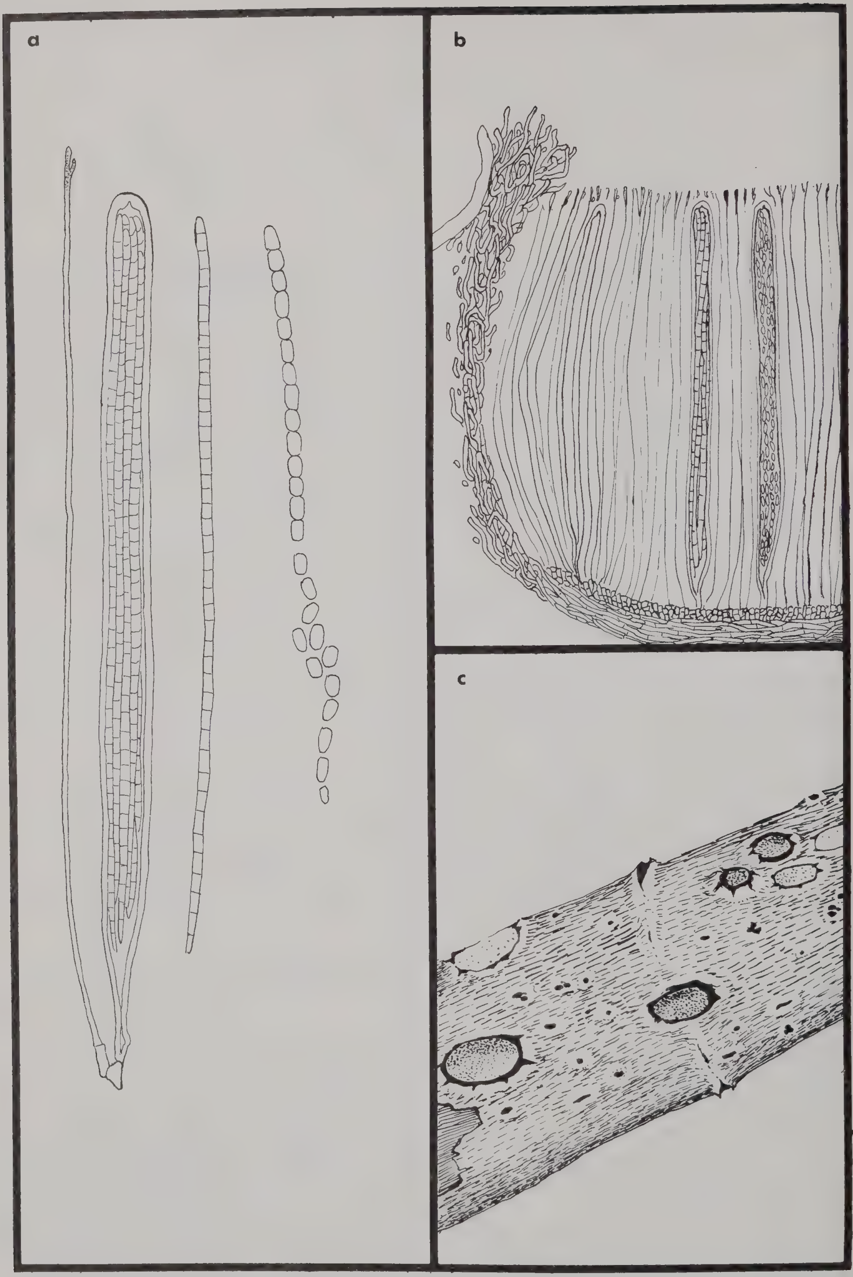

FIGURE 46. *Schizoxylon ligustri*. a. Ascus, paraphysis, and spores, x750. b. Cross section of margin, x425. c. Habit sketch, x7.5. Drawn from the holotype of *S. ligustri*.

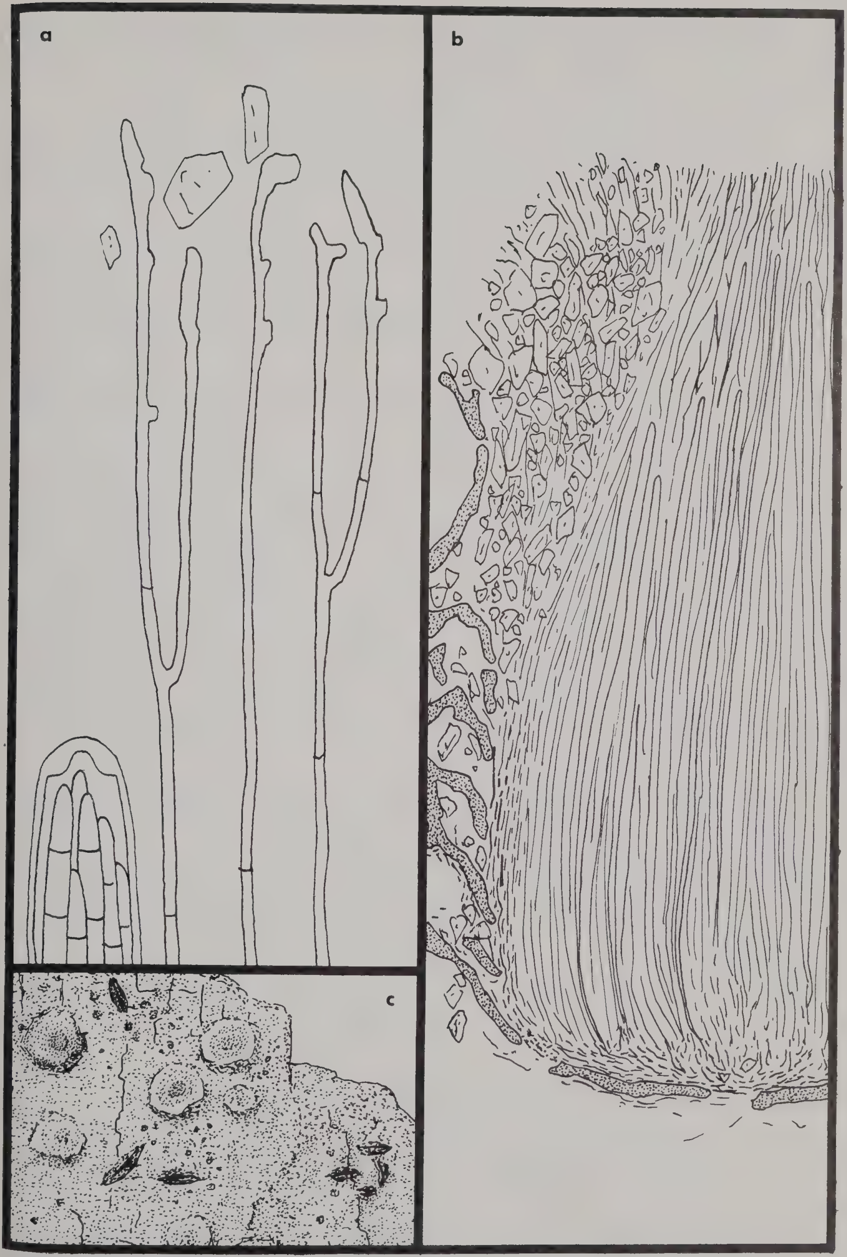

FIGURE 47. *Schizoxylon melleum*. a. Apices of an ascus, paraphyses, and spores, x1500. b. Cross section of apothecium, x150. c. Habit sketch, x7.5. Drawn from the holotype.

crystalliferous at their tips, J-. Asci 300-500 x 9-10 μm, the cap 3.0 μm thick, pierced by a broad pore. Ascospores 8, nearly as long as the asci, 2.0 μm broad, septate, the cells 5-7 μm long, not disarticulating.

On wood, Vermont. This species is similar to *S. alboatrum*, from which it differs in having somewhat broader asci and spores, and a completely colorless wall and paraphyses tips.

SPECIMENS EXAMINED: NORTH AMERICA: USA (NYS, on ?*Platanus*, Pringle 490, holotype of *Ostropa mellea*)

(19). (SCHIZOXYLON MICROSPORUM) Davidson & Lorenz
≡ *Acarosporina microspora* (Davidson & Lorenz) Sherwood, q.v.

(20). SCHIZOXYLON MICROSTOMUM Ellis & Everh., Bull. Torrey Bot. Club 24: 136 (1897)

Figure 48

Apothecia scattered, at first immersed and appearing as black pustules on the surface of the stem, then erumpent through the cortex, 0.5 mm diam., surrounded by a patch of stromatized wood which makes the fruitbody appear larger than it really is, the disc black, the margin dark grey. Margin in cross section nearly obsolete. Paraphyses numerous, filiform, 1.0 m thick below, not enlarged above, once-branched, brown at the tip and imbedded in brown amorphous matter, J+ blue. Asci 250 x 12-16 μm, thin-walled, without any defined apical apparatus, J-. Ascospores 8, nearly as long as the asci, soon breaking up into part-spores 12-20 (-30) x 4.0-4.5 μm, these at first simple, becoming 3(-5) septate before discharge.

On *Andromeda ligustrina*, New Jersey. Fungi Columbiani 1313 may be a duplicate of the type, in which case the species is known from only one collection.

SPECIMENS EXAMINED: NORTH AMERICA: USA (NY, on *Andromeda*, New Jersey, 20.IV.1896, holotype of *S. microstomum*; Fungi Columbiani 1313, on *Andromeda*, New Jersey, April, 1896 [isotype?])(CUP-Atkinson, Fungi Columbiani 1313)

(21). (SCHIZOXYLON MONILIFERUM) Ellis & Everh.
≡ *Acarosporina monilifera* (Ellis & Everh.) Sherwood, q.v.

(22). SCHIZOXYLON NIGRELLUM (Sommerfelt) Sherwood, comb. nov.
≡ *Stictis nigrella* Sommerf., Suppl. Fl. Lapp. 303 (1826)
≡ *Stictis lecanora* (Schm. & Kunze) Fr. b. [var.?] *nigrella* (Sommerf.) Fr., Elench. Fung. 2: 24 (1828)
≡ *Ocellaria nigrella* (Sommerf.) Rehm in Rabenh., Krypt.-Fl. ed. 2, 1(3): 136 (1888)

Figure 49

Apothecia at first immersed, then erumpent, splitting the epidermis into 3 or 4 irregular lobes, 0.5-0.8 mm diam., orbicular, the disc black, shallowly cupulate, smooth and shining, the margin pale grey, pruinose, involute when dry.

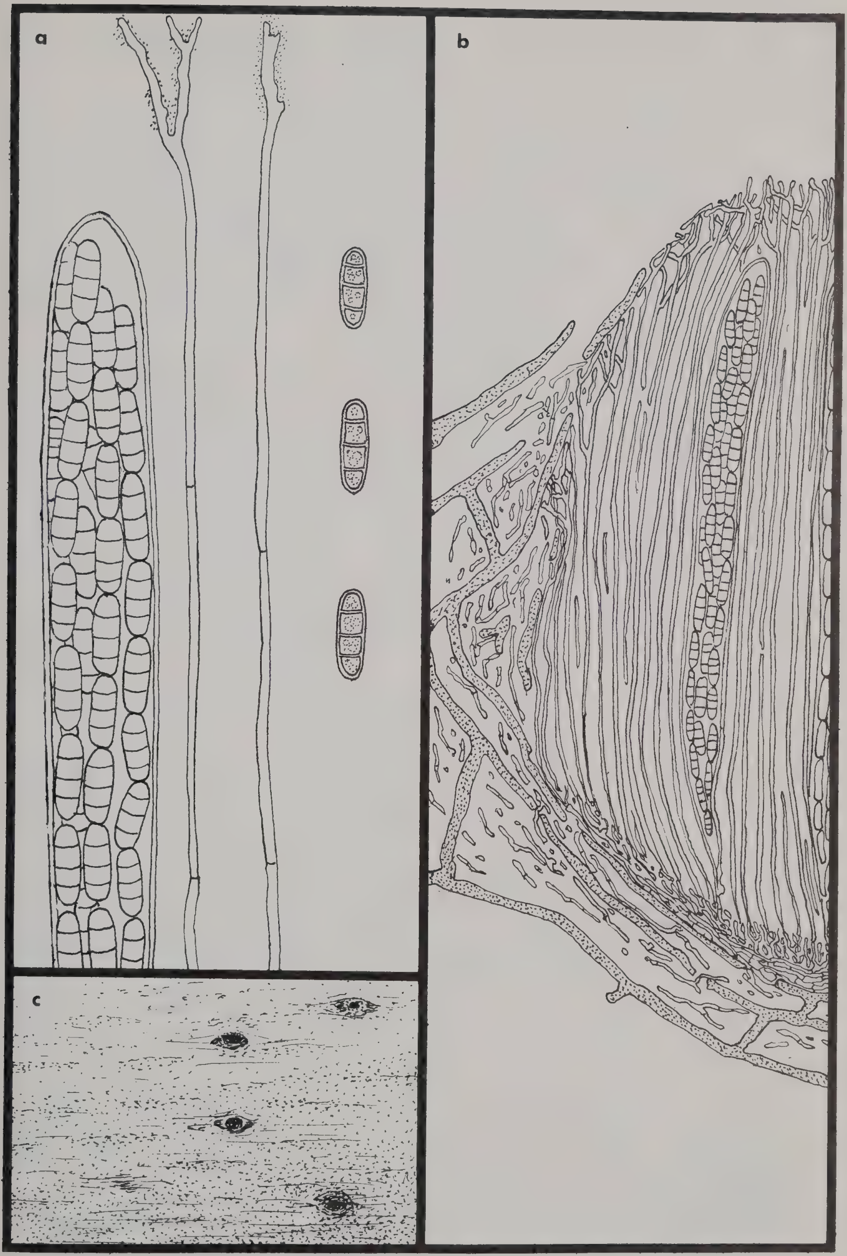

FIGURE 48. *Schizoxylon microstomum*. a. Detail of apices of an ascus, paraphyses, and part-spores, x750. b. Cross section of apothecium, x375. c. Habit sketch, x7.5. Drawn from the holotype.

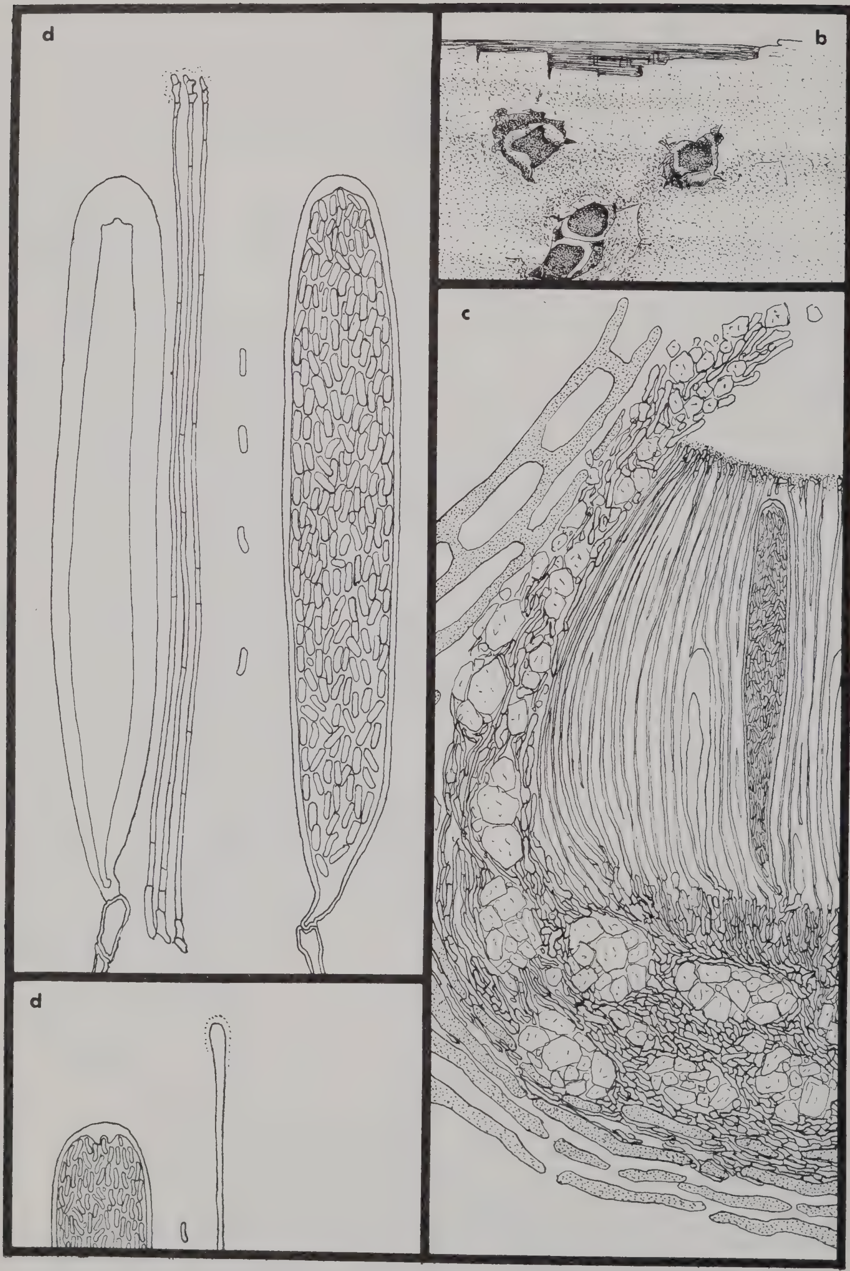

FIGURE 49. a-c. *Schizoxylon nigrellum*. a. Asci, part-spores, and paraphyses, x750. b. Habit sketch, x7.5. c. Cross section of apothecium, x375. Drawn from the holotype. d. Detail of the ascus of *Tympanis saligna*, drawn from CUP-Krieger Fungi Saxonici 2230.

Margin in cross section well-developed, somewhat fleshy, of brown hyphae 1.5 (-3.0) µm diam. intermingled with numerous colorless crystals, continuing below the hymenium as a basal layer c. 100 µm thick of angular brown cells and large, non-rosettiform crystalline inclusions. The structure of the margin is reminiscent of *Therrya*. Paraphyses numerous, exceeding the asci by 25 µm, 1.0 µm diam. below, the tip enlarged to 2-2.5 µm, brown, agglutinated and perhaps anastomosing with adjoining hyphae, indistinguishable from pseudoparaphyses of Hysteriaceous fungi, J-. Part-spores innumerable, more than 8-seriate, 3-5 x 1.5(-2) µm. Asci 130-150 x 15-18 µm, very thick-walled when young, without a distinct apical cap, J-.

On bark of *Salix*, Lappland. This is not *Tympanis saligna* Tode (cfr. Groves, 1952) which is shown for comparison in figure 49d. I could discern no immature spores in the material I examined and am unsure whether the spores arise from disarticulating of filiform spores in asci which are more than 8-spored, elongation of part-spores from 8-spored asci, or budding of primary ascospores. Fries's synonymy with *Stictis lecanora* was made without reference to microscopic characters. Rehm could not have seen Sommerfelt's type; the species is no *Ocellaria*. It is also quite out of place in *Tympanis*. It may ultimately prove to be Patellariaceous.

SPECIMEN EXAMINED: EUROPE: Norway (O, on *Salix*, 1.[18]24, Sommerfelt, holotype of *Stictis nigrella*)

(23). SCHIZOXYLON OCCIDENTALE Ellis & Everh.
= *Schizoxylon berkeleyanum* (Dur. & Lév.)Fckl. subsp. *decipiens* (Karst.) Karst., q.v.

(24). SCHIZOXYLON PERSOONII Schw., Trans. Amer. Philos. Soc. n.s. 4: 249 (1832)
≡ *Schizoxylon sepincola* Pers.

Schweinitz attributes the name to "Fries Syst. Veg. p. 121." which is not a specific diagnosis, but a redescription of "*Schizoxylon* Pers." Fries mentioned no species in his description, but since the genus was then monotypic, the description is ultimately tied to *S. sepincola*. For nomenclatoral purposes I believe the name is validly published, but superfluous.

(25). SCHIZOXYLON PRUINIFERUM Sherwood, spec. nov.

Figure 50

Ascocarpi primum immersi, non erumpescentes, non profunde cupulati, 0.5-0.8 mm diam., margine integro, albo, disco albo. Margo in sectione transversali 10 µm crassus, siccus ab hymenio se non abrumpens, ex hyphis intertextis achromis constans. Paraphyses filiformes, ramosae, 350-450 x 1.0 µm, apice non incrassatae, achromae, in iodo non caerulescentes. Asci 200 x 8.0 µm, apice 2.5-3.0 µm crassi, 8-spori. Spori 200 x 2.0 µm, cellulis 4.5-5.0 µm longis ad septa se disjungentibus et articulos simplices formantibus.

HOLOTYPUS: IMI 56454, on dead twigs of tangerine (*Citrus nobilis*), Njala (Keri), Sierra Leone, Compton 13.II.1954.

Apothecia gregarious on small decorticated twigs, immersed, not becoming erumpent, the disc 0.5-0.8 mm broad, orbicular, white-pruinose; definite margin absent. A few layers of more densely agglutinated, colorless hyphae, not obviously differentiated from the paraphyses, form a spurious wall 10 µm thick surrounding the ascocarp. Paraphyses 350-450 x 1.0 µm, septate, colorless, 1-2 times branched near the apex but not enlarged, colorless, abundantly crystalliferous, J-. Asci 300 x 8 µm, very thick-walled when young, the cap 2.5-3.0 µm thick. Spores 8, filiform, 200 x 2.0 µm, soon breaking up into cylindrical part-spores 4.5-5.0 µm long.

On wood, Sierra Leone, Africa. This unusual species was identified in the field as *Stictis*, to whose immature fruitbodies its apothecia bear some resemblance.

SPECIMEN EXAMINED: See holotype, above.

(26). SCHIZOXYLON SEPINCOLA Pers., Ann. Wetterauischen Ges. Gesammte Naturk. 2: 11 (1810)

Figure 51

Apothecia at first immersed in bleached areas on wood, becoming erumpent, 0.5-0.8 mm diam., orbicular, with a raised shining black margin and shallowly cupulate disc, resembling *Karschia* in external appearance. Margin in cross section 150 µm thick, non-crystalliferous, the inner layer of loosely interwoven hyphae 1.5 µm diam., the outermost layer of brown hyphae 2.0-2.5 µm diam., short-celled and tightly-packed. Subhymenium colorless, J-. Paraphyses 150 x 1.0 µm, enlarged to 2.0 µm at the tip, which is 1-2 times branched, brown, and imbedded in brown amorphous material, J-. Asci 120-140 x 7-9 µm, thick-walled when young, the cap 1.5 µm thick, J-. Spores 8, 80-100 x 2.5 µm, soon disarticulating into unicellular cubical or short-cylindrical part-spores 3-3.5 µm long.

Pycnidia 0.2-0.3 mm diam., black, shining, the wall resembling that of the ascigerous stage, without a distinct ostiole, containing a single simple cavity lined with phialides 3.0 x 5-6 µm, monophialidic, without a prominent collarette, producing numerous unicellular, colorless, ovoid uniguttulate conidia 3-5 x 1.5-2 µm.

On decorticated conifer wood, Europe. Early authors stated that the species was common, but it does not seem to have been collected in recent years. It should be sought in western North America.

SPECIMENS EXAMINED: EUROPE: France (FH, NY, Stirpes Cryptogamae Vogeso-Rhenanae 174, on *Abies*). Locality unknown (LG, sine coll., possible holotype of *Schizoxylon sepincola*)(FH, Herb. Richard, on *Abies*; "*Schizoxylon majusculum* Richard")

(27). SCHIZOXYLON SULFURINUM Sherwood, spec. nov.

Figure 52

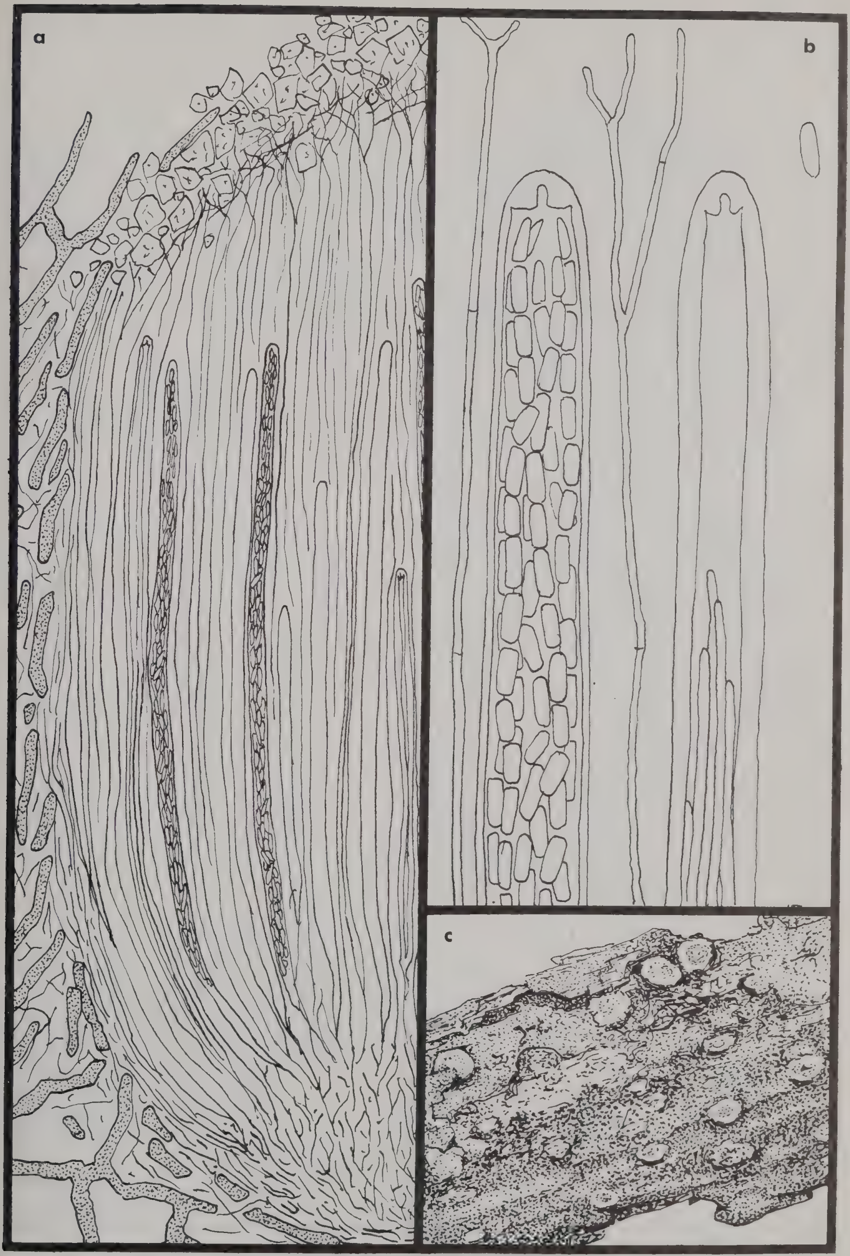

FIGURE 50. *Schizoxylon pruiniferum*. a. Cross section of margin, x300. b. Asci, part-spores, and paraphyses, x1500. c. Habit sketch, x7.5. Drawn from the holotype.

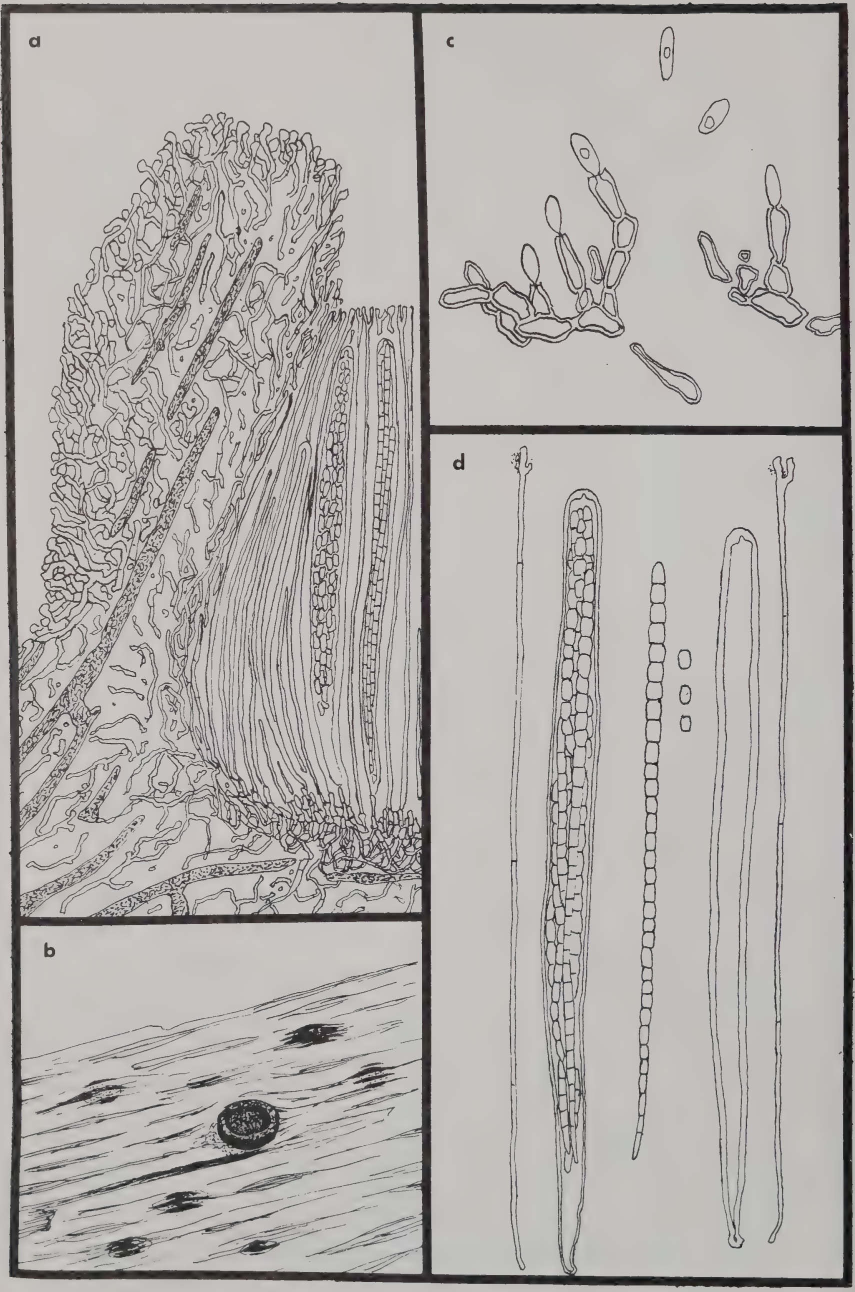

FIGURE 51. *Schizoxylon sepincola*. a. Cross section of margin, x375. b. Habit sketch, x7.5. c. Conidiophores and pycnidiospores, x1500. d. Asci, paraphyses, spores, and part-spores, x750. a,b & d drawn from FH-Stirpes Crypt. Vogeso-Rhenanae 174. c drawn from FH-"*S. majusculum*".

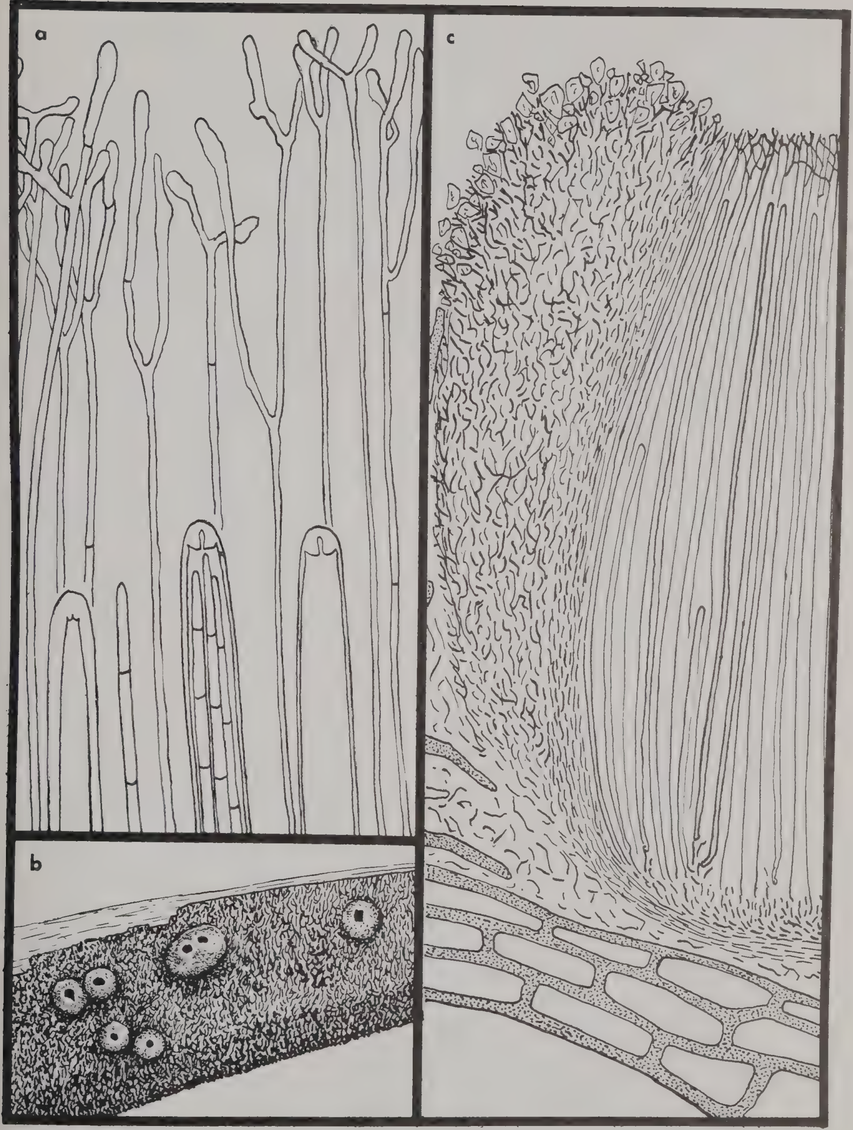

FIGURE 52. *Schizoxylon sulfurinum*. a. Detail of apices of asci, paraphyses, and spores, x1500. b. Habit sketch, x10. c. Cross section of apothecium, x187.5. Drawn from the holotype.

Ascocarpi primum immersi, erumpescentes, non profunde cupulati, 0.7-1.2 mm diam., margine integro, sulphureo, disco nigro. Margo in sectione transversali 100 μm crassus, siccus ab hymenio se non abrumpens, ex hyphis intertextis brunneis

constans. Paraphyses filiformes, ramosae, 550-580 x 1.0 µm, apice ad 2.5 µm incrassatae, brunneae, in iodo non caerulescentes. Asci 500 x 4.5 µm, apice ad 3.0 µm crassi, 8-spori. Sporae 500 x 1.0-1.2 µm, cellulis 8-10 µm longis.
HOLOTYPUS: COL [Dumont] 5042, along Sogamoso-Aguazul rd. at a point ca. 11km from intersection with Sogamoso-Aquitania rd., Dpto. Boyacá. Dumont, Capenter, Sherwood, Molina, 13.VI. 1976. Elev. va. 11,200'. ISOTYPUS: NY

Apothecia at first immersed, becoming erumpent and at length appearing nearly superficial, 0.7-1.2 mm diam., orbicular in cross section, rarely 2-confluent, bright yellow-pruinose, with a small, black, glabrous, punctiform disc, appearing pyrenomycetous. Margin in cross section 100 µm thick, the inner part of interwoven, colorless, somewhat gelatinous hyphae 1.0 µm diam., the outer part of brown crystalliferous hyphae 1.5 µm diam. Subhymenium 45 µm thick, colorless, J-, of isodiametric cells 2-4 µm diam., resting on 35 µm of faintly brownish hyphae 1.5 µm diam. Paraphyses numerous, filiform, 1.0 µm broad below, inflated to 2.5 µm apically, brown, J-, forming an epithecium 80 µm thick. Asci 500 x 4.5 µm, the cap 3.0 µm thick, 8-spored. Spores nearly as long as the asci, 1.0-1.2 µm diam., septate, the cells 8-10 µm long, not disarticulating.

On herbaceous stems, Colombia. Superficially it appears similar to *S. berkeleyanum*, but the asci and spores are quite unlike those of that species. *S. albo-atrum* has shorter, broader spores, and is never yellow.

SPECIMEN EXAMINED: See holotype, above.

(28). (SCHIZOXYLON TUBERCULATUM) Schw., Trans. Amer. Philos. Soc. n.s. 4: 249 (1832)

The holotype is a pycnidial fungus, ?*Cellulosporium* Peck, according to S. J. Hughes (note with specimen).

SPECIMEN SEEN: NORTH AMERICA: USA (PHIL, Schweinitz, Bethlehem, Pennsylvania, holotype of *Schizoxylon tuberculatum*).

(78). *STICTIS* Pers., Obs. Mycol. 2: 73 (1799)

Lectotype species: *Stictis radiata* Pers., l.c., designated by Rabenhorst (1844).
≡ *Stictis* subgen. *Stictis* Fr., Syst. Mycol. 2: 195
≡ (1822)
≡ *Stictis* subgen. *Corticiae* Fr., *ibid.*: 193 (1822)
= *Lichenopsis* Schw.
= *Schmitzomia* Fr.
= *Cyclostoma* Crouan & Crouan
= *Platysticta* Cke. & Massee
= *Cylindrina* Pat.

Apothecia at first immersed, opening by a pore, sometimes becoming erumpent or splitting the overlying substrate irregularly, 0.05-3.0 mm broad, the margin entire to lacerate, typically with a prominent white-pruinose rim, tough or somewhat gelatinous, white, flesh-colored, yellowish, brown, or black , the disc moderately-deeply to very-deeply immersed, pale ochraceous to flesh-colored, brown, or black, sometimes pruinose, splitting away from the margin when dry. Margin in cross section typically 3-layered, with or without a spurious thalline margin of compressed host tissue invaded by vegetative hyphae, sometimes with a complete or incomplete stromatic layer between the thalline margin and the wall hyphae. Wall paraplechtenchymatous, of interwoven, narrow-diameter hyphae, colorless or some shade of brown, gelatinous in some species. A distinct crystalline layer separates the wall from the periphysoids in most species. Periphysoids distinct, usually filamentous, rarely pseudoparenchymatous, simple or branched, colorless or some shade of brown. Subhymenium small-celled, J+ or J-, resting on host tissue or an extension of the wall. Paraphyses numerous, filiform, sometimes apically branched or enlarged, colorless or some shade of brown, often imbedded in a J+ gelatinous matrix. Asci cylindrical, somewhat thick-walled when young, functionally unitunicate, with a more or less prominent apical non-refractive cap pierced by a J- apical pore. Ascospores 4 or 8/ascus, colorless, transversely septate, sometimes sheathed, sometimes coiling when freed from the ascus, typically long-cylindrical to filiform.

On wood, bark, herbaceous stems, grass culms, and fern rachides, less commonly on leaves, predominantly (perhaps exclusively) saprophytic, worldwide in distribution but commonest in maritime areas and tropical cloud forests. Terminology and arrangement of ascocarp tissues are discussed in section IV, above.

Rabenhorst (1844) accepted five infrageneric taxa in *Stictis*: *Propolis* Fr.; *Melittosporium* (Cda.) Rabenh.; *Cryptodiscus* (Cda.) Rabenh., *Xylographa* Fr., and *Stictes verae* Rabenh. (= *Corticiae* Fr.). Since *Propolis* and *Xylographa* were treated by Fries (1822) as subgenera, it is reasonable to assume that they represent subgenera in Rabenhorst's (1844) treatment. Of the three original Persoonian species of *Stictis*, *Stictis rufa* is included under *Agyrium*, and *S. pallida* is listed as *S. (Cryptodiscus) pallida*, leaving only *S. radiata* in *Stictes verae*. Assuming that the exclusion of all but one of the original species from the type subgenus is equivalent to excluding all of the original species but one from the genus, this constitutes implicit typification, sensu Korf and Rogers (1967), provided that only the species included by the original author are eligible as lectotypes. The International Code of Botanical Nomenclature is unclear on this point, and some authors, for example Powell (1974), maintain that only those species accompanying the first valid publication of the name are eligible as lectotypes. If the three species included in the genus by the validating author (S. F. Gray, 1821) or the 20 species included by the sanctioning author (Fries, 1822) are eligible as lectotypes, then the first proposal for lectotypification of *Stictis* is Fries's (1849) explicit typification of *Stictis* with *S. pallida*. Acceptance of this lectotype (which is now considered to be the lectotype of *Cryptodiscus*) would greatly disrupt all recent concepts of *Stictis* and *Cryptodiscus*. A third alternative would be to propose conservation of *Stictis* with *S. radiata* as its type.

The basionym of *Stictis radiata* is widely cited as being *Lycoperdon radiatum* L. There is no evidence that Persoon saw Linnaean material of *Lycoperdon radiatum*. In his protologue, Persoon lists *L. radiatum* as a questionable synonym and discusses the points of difference between his material and Linnaeus's description of a fungus about the size of a coriander seed (about 3 mm, or twice the maximum size of *Stictis radiata*) which opened by splitting nearly to the base into 12 equal lobes. As Rehm (1887-96) pointed out, this description does not fit *S. radiata* at all.

According to Savage (1945), there is authentic material of *L. radiatum* in the Linnaean herbarium. This cannot be borrowed. In view of Persoon's expressed doubts concerning the identity of the two species, I consider it advisable to treat *Stictis radiata* Pers. as a Persoonian name, typified by the material in Persoon's herbarium. The epithet *radiata* is the one sanctioned by Fries. It is possible that one of the earlier names *Lycoperdon oxycanthae* Schrank, *Sphaerobolus rosaceus* Tode, *Lichen excavatus* Hoffm., or *Peziza marginata* Sow. is synonymous, and would provide the correct epithet assuming a 1753 starting point date for the nomenclature of Ascomycetes.

The critical features separating *Stictis* from allied genera are a more or less orbicular fruiting body which opens by a pore and has a margin lined with periphysoids which extend the whole length of the margin, a vertical hymenium which splits away from the margin when dry, and a non-parasitic niche. In most species the asci have an obvious apical cap, and, except in *S. monilifera* and *S. stigma*, the spores show no tendency to disarticulate at the septa in fully-mature, properly-preserved specimens, although they may disintegrate in overmature or poorly-preserved material. The filiform spores of *S. radiata* are discharged as a unit and coil irregularly on the substrate.

The spores of *Stictis* are extremely variable from species to species. The variation is not correlated with the characters used to delimit the three sections accepted below. The filiform, multiseptate, unsheathed spores of *S. radiata* are typical. In species where the spores are truly threadlike (length:width ratio > 100:1), their breadth does not vary perceptibly from top to bottom. In species with shorter ascospores, the spores may be either largest at the apex, tapering basally to an acuminate tip, or largest a little below the apex, tapering both apically and basally. Some species have spores which are constricted at the septa. The number of septa ranges from 3 to 300 or more. I have expressed septation in terms of length of cells and length of spore, rather than in terms of the number of septa, which are tedious to count in filiform-spored species. Many species have spores with a definite sheath, which may be so prominent in immature spores that they resemble "ghosts" with a nearly invisible, threadlike lumen. Long cylindrical ascospores with occasional longitudinal septa, such as occur in *Conotrema harmandii*, are unreported. I would consider ovate muriform spores which did not seem to be an abnormality to be sufficient reason for exclusion from the genus.

Marginal characters serve to divide *Stictis* into three somewhat intergrading sections.

In section *Stictis*, the margin is entirely colorless, although included host tissue may make it appear dark. Normally, there is a distinct crystalline layer, although this is reduced in a few species. Periphysoids are abundant and form a distinct layer. The wall layer may be absent, but it is never notably crystalliferous and does not split away from the substrate.

The apothecia of section *Lichenopsis* have a wall layer which is decidedly crystalliferous, and which splits away from the surrounding host tissue before the apothecia open, so that immature ascocarps are enclosed by a crystalline peridium and mature ascocarps have a distinctly annulate margin, which may be colorless or brown. In some species, for example *Stictis ostropoides*, the ascocarp ultimately opens by a longitudinal slit; in others, such as *S. sphaeroboloidea*, dehiscence is irregular.

In section *Cyclostoma*, the wall layer, which may or may not be surrounded by a distinct and differentiated stroma, is composed of brown hyphae. Occasionally the periphysoids, paraphyses, or hyphae of the crystalline layer may be pigmented as well. A distinct crystalline layer is lacking in many species.

A comparison of *Stictis dicksoniae* with *Robergea canariense*, or *Stictis quadrinucleata* and *S. minor* with *Propolidium pruinosum*, will serve to demonstrate that the three genera intergrade.

A key to accepted species below is followed by an alphabetical list of included and excluded species.

Key to Included Species of Stictis

1. Hymenium remaining covered by a peridium after rupture of the covering host tissue, eventually opening by a slit or tearing irregularly; margin annulate. sect. *Lichenopsis* (2)

1'. Hymenium soon opening by a pore; margin not annulate (except in *S. polycocca*) (5)

2(1). Paraphyses with a prominent, brown, inflated tip. *Stictis sphaeroboloidea*

2'(1). Paraphyses colorless, not inflated at the tip.(3)

3(2'). Ascospore cells averaging more than 4.0 µm long. (4)

3'(2'). Ascospore cells 2.5 - 3.5 µm long. *S. ostropoides*

4(3). Spores 2 µm broad; margin brown. *S. chrysopsis*

4'(3). Spores 3 µm broad. Margin colorless. *S. virginea*

5(1'). Marginal hyphae pigmented. sect. *Cyclostoma* (6)

5'(1'). Marginal hyphae colorless. sect. *Stictis* (24)

6(5). Paraphyses brown, at least apically. (7)

6'(5). Paraphyses colorless (13)

7(6). Ascospores more than 3.0 µm broad (8)

7'(6). Ascospores less than or = 3.0 µm broad. (10)

8(7). Marginal paraphyses present, brown. *S. lumbricus*

8'(7). Brown marginal paraphyses absent (9)

9(8'). Ascospores 250-325 x 4.5-5.0 µm (Europe).

S. pachyspora

9'(8'). Ascospores 350-450 x 4-5 (-6) µm (North America) *S. serpentaria*

10(7'). Brown marginal paraphyses present. *S. oculiformis*

10'(7'). Brown marginal paraphyses absent (11)

11(10'). Periphysoids up to 100 µm long, branched, forming a conspicuous layer. *S. korfii*

11'(10'). Paraphyses much shorter, simple (12)

12(11'). Ascospores 400-475 µm long. *S. dicksoniae*

12'(11'). Ascospores 85-100 µm long. *S. lanugicincta*

13(6'). Ascospores over 250 µm long (14)

13'(6'). Ascospores under 250 µm long (rarely over 200 µm long (16)

14(13). Hymenium J+ blue. *S. viticola*

14'(13). Hymenium entirely J- (15)

15(14'). Ascospores 2-3 µm broad. Periphysoids numerous, branched, forming a conspicuous layer. *S. bicolor*

15'(14'). Ascospores 1.5 µm broad. Periphysoids simple. *S. gigantea*

16(13'). Ascospores under 100 µm long (17)

16'(13'). Ascospores all, or nearly all, over 100 µm long (18)

17(16). Ascospores 50-90 x 2.0 µm, the cells 2.5-3.5 µm long. Hymenium J-. *S. caballeroi*

17'(16). Ascospores 50-60 x 2.0-2.5 µm, the cells 6-7 µm long. Hymenium J+. *S. schizoxyloides*

18(16'). Ascospores all less than 1.5 µm broad (19)

18'(16'). Ascospores 1.5-2.5 µm broad (21)

19(18). Paraphyses simple (20)

19'(18). Paraphyses apically branched. *S. polycocca*

20(19). Paraphyses apically enlarged, not circinate. *S. fuscella*

20'(19). Paraphyses unenlarged, circinate. *S. pustulata*

21(18'). Periphysoids filamentous (22)

21'(18'). Periphysoids pseudoparenchymatous. *S. elevata*

22(21). Chiefly graminicolous. Internal crystalline layer well-developed. *S. arundinacea*

22'(21). Corticolous and lignicolous. Internal crystalline layer poorly defined. (23)

23(22'). Margin fleshy and somewhat gelatinous when wet (Europe). *S. mollis*

23'(22'). Margin carbonized. (North America). *S. fusca*

24(5'). Spores more than 3 µm broad (25)

24'(5'). Spores less than or = 3 µm broad (33)

25(24). Paraphyses circinate or propoloid (26)

25'(24). Paraphyses more or less simple, not circinate or propoloid (29)

26(25). Ascospores more than 300 µm long, conspicuously sheathed. *S. xenospora*

26'(25). Ascospores under 100 µm long (27)

27(26'). Fruitbodies strongly erumpent, with a thick, yellow margin, fleshy when wet. *S. friabilis*

27'(26'). Fruitbodies immersed, the margin white, not fleshy (28)

28(27'). Ascospores 3-septate. *S. quadrinucleata*

28'(27'). Ascospores 10 or more septate. *S. dumontii*
29(25'). Spores less than 100 µm long (30)
29'(25'). Spores more than 100 µm long (32)
30(29). Spores coiling strongly when released from the ascus. *S. sagaretiae*
30'(29). Spores not coiling when released from the ascus (31)
31(30'). Spores 45-60 x 3.0-3.5 µm; hymenium J-. *S. lupini*
31'(30'). Spores 65-90 x 3.5-4.0 µm; hymenium J+. *S. brachyspora*
32(29'). Spores 3.0-3.5 µm broad, tapered basally, the cells 2.5-2.5 µm long (see also *S. radiata*) *S. carnea*
32'(29'). Spores 3.5-4.5 µm broad. *S. hawaiiensis*
33(24'). Paraphyses circinate or propoloid (34)
33'(24'). Paraphyses not circinate or propoloid (39)
34(33). Paraphyses circinate (35)
34'(33'). Paraphyses propoloid (37)
35(34). Ascospores 250-300 x 1.75-2.25 µm, the cells 3-4 µm long. *S. prominens*
35'(34). Ascospores 1.5 - 1.75 µm broad, the cells over 5 µm long (36)
36(35'). Margin fleshy-gelatinous when rehydrated; periphysoids branched. North America. *S. hydrangeae*
36'(35'). Margin not fleshy-gelatinous when rehydrated; periphysoids mostly simple. South America. *S. ramuligera*
37(34'). Ascospores under 75 µm long. *S. javanica*
37'(34'). Ascospores 100 µm long or more (38)
38(37'). Apothecia 0.5-0.8 mm diam., the margin 175 µm thick, with a very thick gelatinous wall. Europe. *S. sarothamni*
38'(37'). Apothecia 0.2-0.5 mm diam., the margin 75 µm thick; wall narrow. South America. *S. carpenteriana*
39(33'). Ascospores 3-septate, short-cylindrical. *S. minor*
39'(33'). Ascospores long-cylindrical or filiform (40)
40(39'). Ascospores 1.5 µm broad or less (41)
40'(39'). Ascospores over 1.5 µm broad (44)
41(40). Periphysoidal layer pseudoparenchymatous. *S. graminicola*
41'(40). Periphysoidal layer filamentous (? very reduced in *S. lichenoides*) (42)
42(41'). Paraphyses with an abrubt, knoblike tip. *S. pusilla*
42'(41'). Paraphyses not inflated at the tip (43)
43(42'). Ascospores sheathed and coiling. *S. helicospora*
43'(42'). Ascospores not sheathed or coiling. *S. lichenoides*
44(40'). Ascus cap 5 µm or more thick (asci containing septate spores) (45)
44'(40'). Ascus cap less than 5 µm thick. (46)
45(44). Ascus cap 5-6 µm thick. Uppermost periphysoids moniliform, gelatinous, 3-4 µm broad. *S. bacciformis*
45'(44). Ascus cap 8 µm thick. Periphysoids all filamentous, 1 µm broad. *S. dennisii*

46(44'). Ascospores moniliform, constricted at the septa and showing some tendency to disarticulate (47)

46'(44'). Ascospores not moniliform, not disarticulating (48)

47(46). Ascospores 2.0 µm broad; apothecia remaining immersed. *S. monilifera*

47'(46). Ascospores 2.5 µm broad; apothecia erumpent. *S. stigma*

48(46'). Spore cells 2.5-4.0 µm long; crystalline layer absent or nearly so. *S. epruinosa*

48'(46'). Spore cells 4-6 µm long; crystalline layer prominent. (49)

49(48'). Periphysoids unbranched, 10-20 x 1.5-2.0 µm. Hymenium usually J-. Ascus cap 2.5-3.0 µm thick. *S. stellata*

49'(48'). Periphysoids branched, 15-30 x 1.0-1.5 µm. Hymenium usually J+. Ascus cap 3.5 µm thick. *S. radiata*

Included and Excluded Species of Stictis

(1). (STICTIS ABIETINA) (Pers.) Farlow in Thaxter, Reliquiae Farlowianae 147 (1922)
≡ *Hysterium abietinum* Pers., Obs. Mycol. 1: 31 (1796)
≡ *Xylographa abietina* (Pers.) Zahlbr., Cat. Lich. Univ. 2: 151 (1924)
= *Lichen parallelus* Ach., Lich. Suec. Prodrom. 23 (1798)
  ≡ *Stictis parallela* (Ach.) Fr., Syst. Mycol. 2: 197 (1822)
  ≡ *Xylographa parallela* (Ach.) Fr., Summa Veg. Scand. sect. post. 372 (1849)

Additional synonyms are given by Rehm (1887-96). Under the name *X. parallela*, this species has long been considered a lichen unrelated to *Stictis*. The CUP specimen of Reliquiae Farlowianae 147 is misidentified and contains *Melittosporium hysterinum*.

(2). STICTIS ADUNCA (Feltg.) Höhn.
= *Stictis polycocca* (Karst.) Karst., q.v.

(3). (STICTIS AECIDIFORMIS) Speg., Michelia 1: 471 (1879)

I could find no fruitbodies in the holotype specimen. According to Spegazzini (l.c.) the species had biseriate to triseriate spores 30-35 x 4-4.5 µm, 10-septate. The description suggests that this is probably not a *Stictis*, but I am unable to place it.

SPECIMEN EXAMINED: EUROPE: Italy (LPS 28242, on *Mahonia*, Lindquist, 7.IV.1879, holotype of *Stictis aecidiformis*)

(4). STICTIS AECIDIOIDES (Nees) S. F. Gray
≡ *Stictis radiata* Pers., q.v.

(5). (STICTIS AERUGINOSA) Pers., Myc. Eur. 1: 338 (1822)
Melittosporium aeruginosum (Pers.) Rehm in Rabenh., Krypt.-Fl. ed 2, 1(3): 173 (1888)
= *Stictis versicolor "c"* Fr., Syst. Mycol. 2(1): 198 (1822)
≡ *Melittosporium versicolor* (Fr.) Corda, Icon. Fung. 2: 38 (1838)
≡ *Propolis versicolor* (Fr.) Fr., Summa Veg. Scand. sect. post. 372 (1849)
= ? *Hysterium viride* Fr., Obs. Myc. 1: 195 (1815)

I have not seen Persoon's original material, but the name *S. aeruginosa* has been cited by Fries (1822) and others as a synonym of *Stictis versicolor*, a muriform-spored Hysteriaceous species discussed briefly under *Melittosporium versicolor*, above. If any material of *Hysterium viride*, the earliest name cited in Fries synonymy of the species, remains in Fries's herbarium, it is not listed under *Stictis*.

(6). (STICTIS ALBA) (DC.) Fr., Elenchus Fung. 2: 27 (1828)
≡ *Sclerotium album* DC., Flore Franc. 5: 112 (1815)
≡ *Xylogramma alba* (DC.) Wallr., Flora Crypt. Germ. 2 510 (1833)
≡ *Propolis alba* (DC.) Fr., Summa Veg. Scand. Sect. Post. 372 (1849)
= *Propolomyces farinosus* (Pers.) Sherwood, Mycotaxon 5: 321 (1977)

The species is usually treated as a synonym of *Propolis faginea* (= *Propolomyces farinosus*). I have not seen De Candolle's original material, but his description would fit that species.

(7). (STICTIS ALBESCENS) Roumeguère, Fungi Gallici Exs. 2079 (1882)

Apothecia at first immersed, opening by a pore, remaining covered by the epidermis of the host, 0.25-0.5 mm diam., colorless. Excipulum colorless, fleshy, pseudoparenchymatous, prolonged to form a covering layer of vertically-oiented tissue, as in some species of *Diplonaevia*. Asci uniformly thin-walled, J-, without a definite apical pore, 60 x 10-15 µm, surrounded by numerous, filiform, colorless paraphyses. Ascospores 8, 45-55 x 2.5 µm, tapered below, transversely multiseptate. Subhymenium faintly J+ blue.

The ascospore dimensions are given by Roumeguère as "80-90 x 3-4"; our material contains no spores this long.

In its morphology, this species more closely resembles *Karstenia* than *Stictis*. It should also be compared with de-lichenized species of *Ramonia*. The J+ reaction of the subhymenium and lack of distinct lateral flanks to the excipulum are out of place in the Dermateaceae.

SPECIMEN SEEN: EUROPE: Belgium (CUP-D-11278, Fungi Gallici Exs. 2079, on *Scirpus*, isotype of *Stictis albescens*)

(8). (STICTIS ANAEXA) Spegazzini
= *Stictis phacidioides* Fr., q.v.

(9). STICTIS ANNULATA Cooke & Phillips
= *Stictis radiata* Pers., q.v.

(10). STICTIS ALBOMARGINATA Ou, Sinensia 7: 668 (1936)

"Apothecia scattered to gregarious, cupulate, sunken in the substratum, except the elevated margin, 1-1.5 mm in diameter and height, externally brownish black, the margin white, pruinose-tomentose, often containing irregularly angular or cubical, hyaline crystal-like substance; hymenium yellowish to honey-colored; asci cylindric, shortly stipitate, 480-530 µ long, 8-9 µ thick; spores multiseriate, hyaline, often twisted at the middle; paraphyses filiform, hyaline, about 1 µ thick," according to Ou, l.c., who compares the species to *Stictis hypodermia* Bres. (= *Schizoxylon albo-atrum*). The type of *Stictis albomarginata* has apparently been lost, and I have seen no satisfactory material on which to base a neotype. It is not clear from the description whether this is a *Stictis* or a *Schizoxylon.*

(11). STICTIS ARAUCARIAE Phil. & Harkn.
= *Stictis monilifera* Phil. & Harkn., q.v.

(12). (STICTIS ARCTOSTAPHYLI) Ferdinandsen & Winge
= *Stictis phacidioides* Fr., q.v.

(13). STICTIS ARUNDINACEA Pers., Myc. Eur. 1: 336 (1822)
≡ *Cyclostoma arundinacea* (Pers.) Crouan & Crouan, Fl. Finist. 30 (1867)
≡ *Schmitzomia arundinacea* (Pers.) Karst., Bidr. Kännedom Finlands Natur Folk 9: 239 (1871)
= *Stictis sesleriae* Libert, Pl. Crypt. Ard. II, 132 (1832)
  ≡ *Stictis arundinacea* Pers. forma *sesleriae* (Lib.) Rabenh., Fungi Europaei 1317 (1870)
= *Stictis luzulae* Lib., Pl. Crypt. Ard. II: 133 (1832)
  ≡ *Schmitzomia luzulae* (Lib.) de Not., Comment. Crittog. Soc. Ital. 1: 365 (1864)
  ≡ *Stictis graminum* Desm., Ann. Sci. Nat. Bot. sér. 2; 13: 85 (1840)
  ≡ *Schmitzomia graminum* (Desm.) Karst., Not. Sällsk. Fauna Fl. Fenn. Förh. 11: 253 (1870)

Figure 52

Apothecia scattered, at first immersed, later opening broadly and somewhat erumpent, 0.5-1.0 mm diam., the disc black, deeply urceolate, the margin dark colored, more or less white-pruinose. Margin, in cross section, 100-150 µm thick, the wall dark brown but not carbonized, of interwoven hyphae 2.0 µm broad. Crystalline layer distinct, of uniformly small (10 µm or less) crystals, very variable in degree of development. Periphysoids numerous, unbranched, nongelatinous, J-, 15-30 x 1.5 µm. The dark wall layer continues beneath the subhymenium. Subhymenium 10 µm thick, of small, colorless, angular cells. Paraphyses numerous, filiform, colorless, scarcely enlarged above, 1.0 µm thick, J-, not circinate. Asci 150-200 x 5-6 µm, the apex 2.5 µm

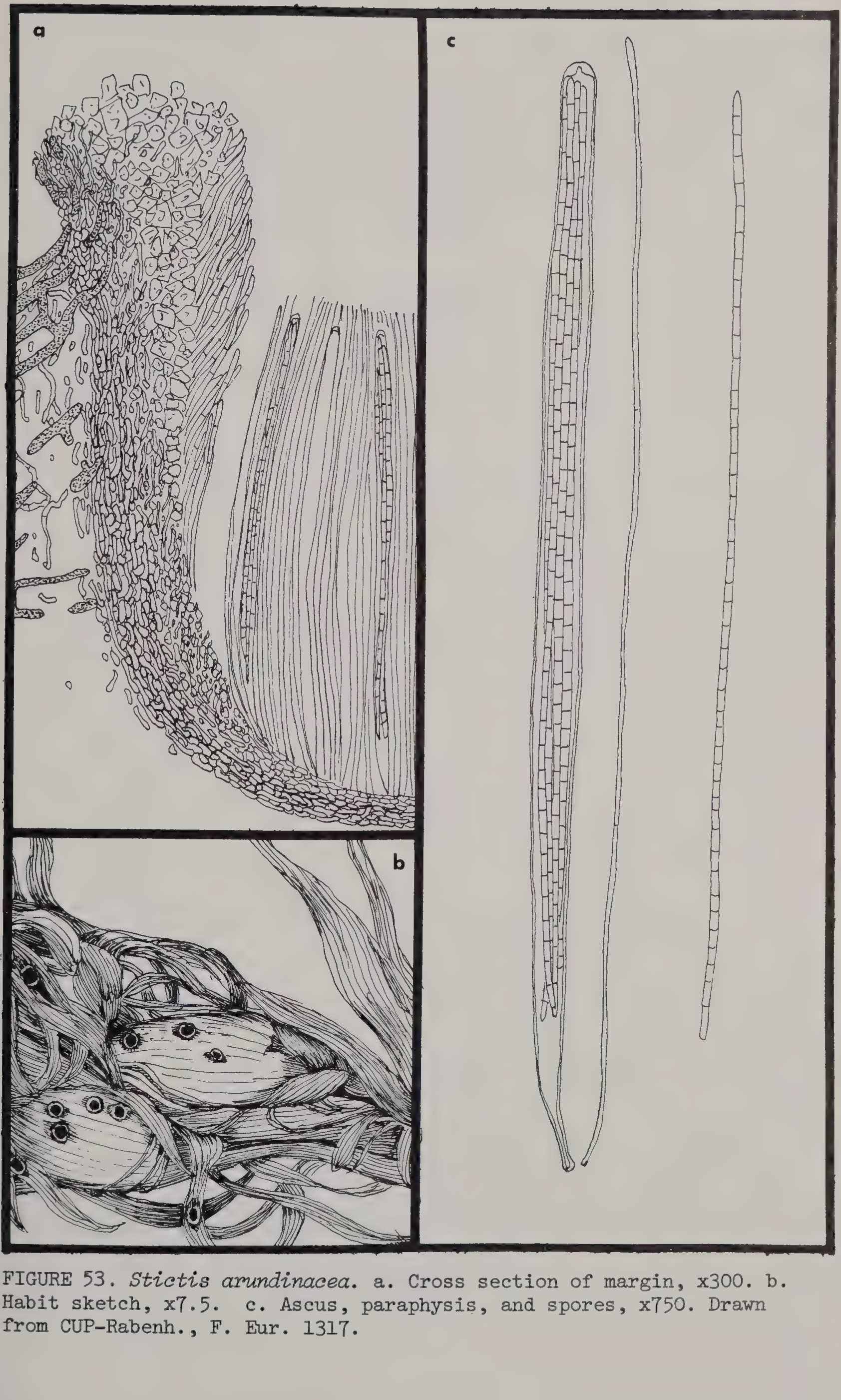

FIGURE 53. *Stictis arundinacea*. a. Cross section of margin, x300. b. Habit sketch, x7.5. c. Ascus, paraphysis, and spores, x750. Drawn from CUP-Rabenh., F. Eur. 1317.

thick. Spores 150-180 x 1.5(-2.0) µm, septate, the cells 5-6 µm long.

On leaves and culms of grasses; occasionally on other hosts. When growing on non-monocotyledonous hosts this species may be distinguished from *S. mollis* by the narrower, more distantly-septate spores. In North America *S. arundinacea* should be critically distinguished from *S. pustulata*, which has circinate paraphyses. Several other species of *Stictis*, including *S. radiata*, occurring on grasses, are sometimes misidentified as *S. arundinacea*. None of these has a dark margin.

Desmazières (l.c.) regarded Libert's epithet *luzulae* as too restricted and substituted *graminum*. Specimens labelled *S. sesleriae* are larger and more darkly pigmented than typical *S. arundinacea*. The microscopic appearance of both species is identical. The name *S. aruninacea* forma *sesleriae* is available for this taxon if one wishes to consider it distinct.

SPECIMENS EXAMINED: EUROPE: France (L, Chaillet in herb. Persoon, probable holotype of *S. arundinacea*)(NY, Herb. Barbey-Boiss. 1088, on *Deschampsia*, as *S. graminicola*; Fautrey, Herb. Crypt. Cote d'or 64, as *Schizoxylon berkeleyanum*, on *Lythrum*). Germany (CUP-D-11778, Rehm, Ascomyceten 469b, on grass; Rabenh. F. Eur. 1317, Arnstadt, on *Sesleria*) Belgium (BR, Libert, Pl. Crypt. Ard 132, on *Sesleria*, isotype of *Stictis sesleriae*; Libert, Fl. Pl. Crypt. Ard. 133, on *Luzula*, isotype of *Stictis luzulae*). Great Britain (CUP-Rabenh. F. Eur. 1141, on *Carex*). Finland (H, on *Rubus*, Karsten 1258). NORTH AMERICA: USA (CUP-D-2215, on *Andropogon*, Mississippi; D-1321, Ravenel, F. Car. 1:42, on *Andropogon*, S. Carolina).

(14). (STICTIS ATRATA) Desm., Ann. Sci. Nat. Bot. sér. 3, 3: 368 (1845)

≡ *Pseudopeziza atrata* (Desm.) Sacc., Syll. Fung. 8: 727 8(1889)

≡ *Hysteropeziza atrata* (Desm.) Höhn., Sitzungber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Cl. Abt. 1, 127: 365 (1918)

≡ *Pyrenopeziza aceris* Nannf., Symb. Bot. Upsal. IV, 8(2): 141 (1932) non *P. atrata* (Pers.) Fckl.

I accept Nannfeldt's placement of this species.

(15). (STICTIS ATRATA) Speg.

≡ *Schizoxylon involutum* Sherwood, q.v.

(16). STICTIS ATRO-ALBA (Phil. & Plowright) Sacc.

= *Stictis elevata* (Karst.) Karst., q.v.

(17). (STICTIS ATROCYANEA) Fr., Syst. Mycol. 2(1): 199 (1822)

≡ *Durella atrocyanea* (Fr.) Höhn., Ann. Mycol. 16: 210 (1918)

Dennis (1956) provides a complete list of synonyms for this species, which he regards as a member of the Helotiaceae (=Leotiaceae). It is discussed briefly under *Durella*, above.

(18). (STICTIS ATROVIRENS) Fr., Sclerom. Suec. 278, nom. nud.
= *Stictis atrocyanea* Fr.

According to von Höhnel (1918), and Dennis (1956), *Stictis atrocyanea* and *S. atrovirens* were based on the same fungus. Fries left no type specimen labelled *S. atrocyanea.* The epithet *atrovirens* was validly published as *Cryptodiscus atrovirens* by Corda in Icones Fungorum 2: 37 (1838).

(19). (STICTIS AURANTIACA) Hazslinski, Mat. Természettud. Közlem. 21: 181 (1881)

According to Gonczöl (*personal communication*), Hazslinski's herbarium was destroyed in World War II. In the original description, the species was characterized by 2 mm broad, orange apothecia with a black margin, circinate paraphyses, and stalked, lanceolate asci containing acicular, multiseptate spores. It may be a species of *Colpoma* or *Coccomyces* (Rhytismataceae).

(20). STICTIS BACCIFORMIS Sherwood, spec. nov.

Figure 54

Ascocarpi primum immersi, erumpescentes, profunde cupulati, 0.8-1.7 mm diam., margine integro, albo, disco pallide ochraceo. Margo in sectione transversali 200 µm crassus, siccus ab hymenio se abrumpens, hypharum pariete 2.0 µm diam., achromo. Stratum crystallinum abest. Periphysoidea 60 x 1.5 µm, ramosa, et 50 x 3-4 µm, non ramosa. Paraphyses filiformes, simplices, 275 x 1.0 µm, apice ad 1.5 µm incrassatae, achromae, in iodo non caerulescentes. Asci 250-275 x 5.5-6(-9) µm, apice 6-7 µm crassi, 8-spori. Sporae 250-260 x 2.0-2.5 µm, cellulis 4-6 µm longis.

HOLOTYPUS: NY, Fungi of Colorado, on a stick, vicinity of Tolland, F.J. Seaver & E. Bethel, August 24-26, 1910.

Etymology: "berry-shaped", because the apothecia resemble berries.

Apothecia at first immersed, becoming erumpent and finally nearly superficial, 0.8-1.7 mm diam., the margin white-pruinose, the disc deeply urceolate, pale ochraceous, splitting away from the margin when dry. Margin in cross section 200 µm thick, surrounded by an outer thalline margin of loosely interwoven hyphae 1.5 µm thick, with thick gelatinous walls, colorless, with sparse included host tissue. Wall c. 50 µm thick, of colorless hyphae 2.0 µm diam., with thick gelatinous walls. The external thalline margin is crystalliferous. Periphysoids dimorphic. In the lower part of the margin, up to the level of the paraphyses apices, they are 60 x 1.5 µm, richly branched, and imbedded in a gel; toward the upper edge of the margin they grade into a matrix of cells oriented perpendicularly to the thalline margin but not forming distinct filaments, the cells 2.5 - 4.5 µm broad, with very thick gelatinous walls. Subhymenium 30 µm thick, of colorless angular cells, J-. Paraphyses numerous, filiform, exceeding the asci by c. 10 µm, 1.0 µm thick below, enlarged to 1.5 µm at the apex, simple, J-.

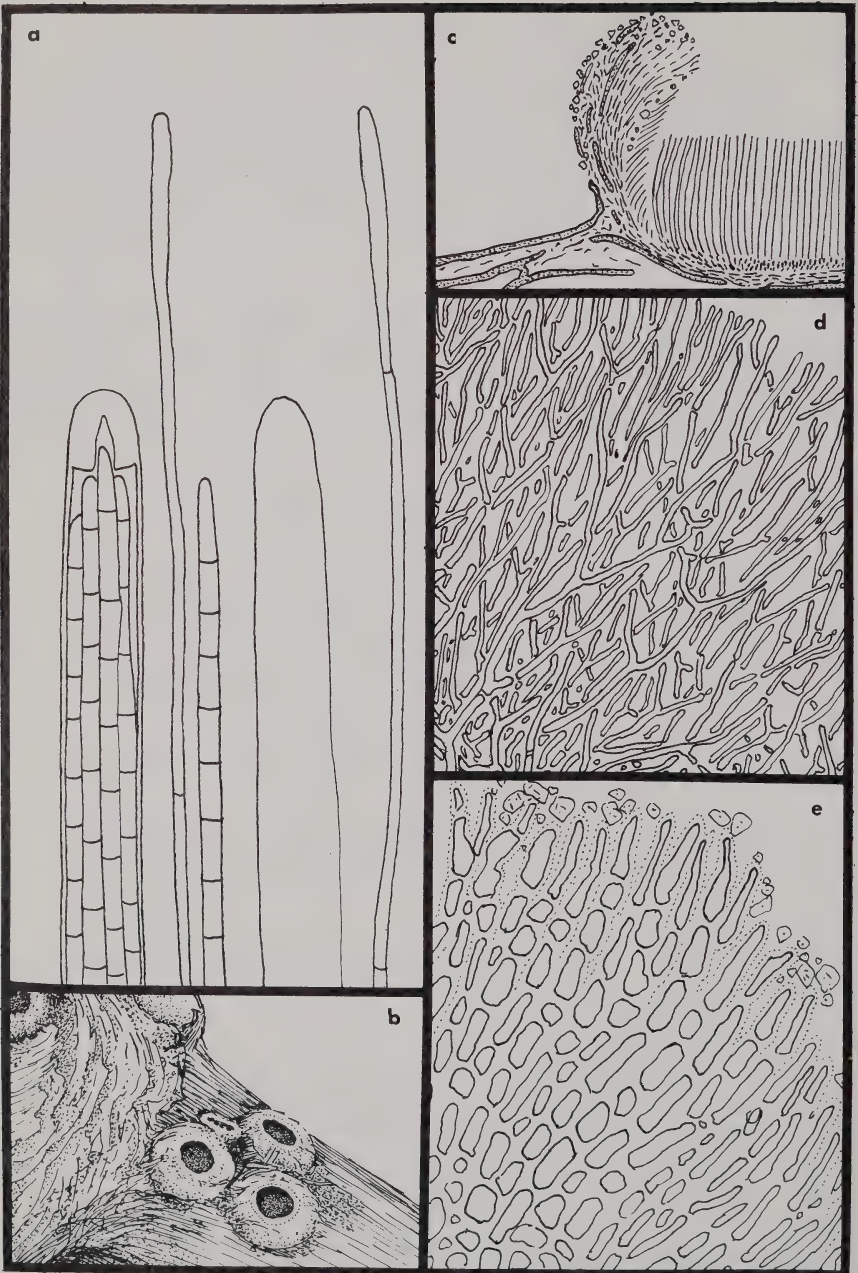

FIGURE 54. *Stictis bacciformis*. a. Detail of apices of asci, paraphyses, and spores, x1500. b. Habit sketch, x7.5 c. Cross section of margin, x60. d. Lower periphysoids, x750. e. Upper periphysoids, x750. Drawn from the holotype.

Asci 250-275 x 5-6(-9) µm, the cap 5-6 µm thick, pierced by a narrow pore. Ascospores 8, 250-260 x 2.0-2.5 µm, the cells 4-6 µm long.

On bark and decorticated wood, Colorado. The large, colorless, gelatinous cells in the upper part of the margin and unusual macroscopic appearance of the fruitbodies readily separate this from any other species of *Stictis*.

SPECIMEN EXAMINED: See holotype, above.

(21). STICTIS BAMBUSELLA Höhn.
= ?*Stictis radiata* Pers., q.v.

(22). (STICTIS BELLA) Kalchbr. & Cooke
≡ *Schizoxylon bellum* (Kalchbr. & Cooke) Sherwood, q.v.

(23). STICTIS BENGALENSIS Singh & Pavgi
= *Stictis radiata* Pers., q.v.

(24). (STICTIS BERKELEYANA) Dur. & Lév.
≡ *Schizoxylon berkeleyanum* (Dur. & Lév.) Fckl., l.c.

(25). (STICTIS BETULI) (Alb. & Schw.) Fr., Syst. Mycol. 2(1): 193 (1822)
≡ *Peziza betuli* Alb. & Schw., Consp. Fung. 309 (1805)
= *Pezicula carpinea* (Pers.) Fckl., Jahrb. Nassauischen Vereins Naturk. 23-24: 279 (1870)

The species is synonymized with *P. carpinea* by Seaver (1951). Fries's (1822) description suggests *Pezicula* rather than *Stictis*. I have seen no original material of this species.

(26). STICTIS BICOLOR (Ellis & Everh.) Starbäck, Bih. Kongl. Svenska Vetensk.-Akad. Handl. 25(14): 15 (1899)
≡ *Schizoxylon bicolor* Ell. & Everh., Bull. Torrey Bot. Club 24: 469 (1897)

Figure 55

Apothecia at first immersed in corticate twigs, opening by a pore, erumpent, the disc exposed at maturity, pale orange, splitting away from the margin when dry. Margin entire, dark grey, slightly pruinose; disc deeply urceolate, splitting away from the margin when dry. Margin in cross section 300 µm thick, with a distinct stromatic border of carbonized cells lying between the wall and the thalline margin and continuing beneath the subhymenium. Thalline margin prominent. The wall and crystalline layers are not sharply delimited from one another and consist of loosely-interwoven brown hyphae 3-5 µm diam., interspersed with scattered rosettiform crystals and amorphous brown material. Periphysoids numerous, richly branched and immersed in a J- gel, up to 85 µm long, 2.0 µm broad at the base, inflated to 3.0 µm at the tip. Iodine reactions none. Paraphyses numerous, filiform, 1.0 µm broad below, barely enlarged above, colorless, unbranched, not forming an epithecium. Asci 275-300 x 6-8 µm, the cap 4.5 µm thick, pierced by a broad pore. Spores 8, nearly as long as the asci, 2.0-3.0

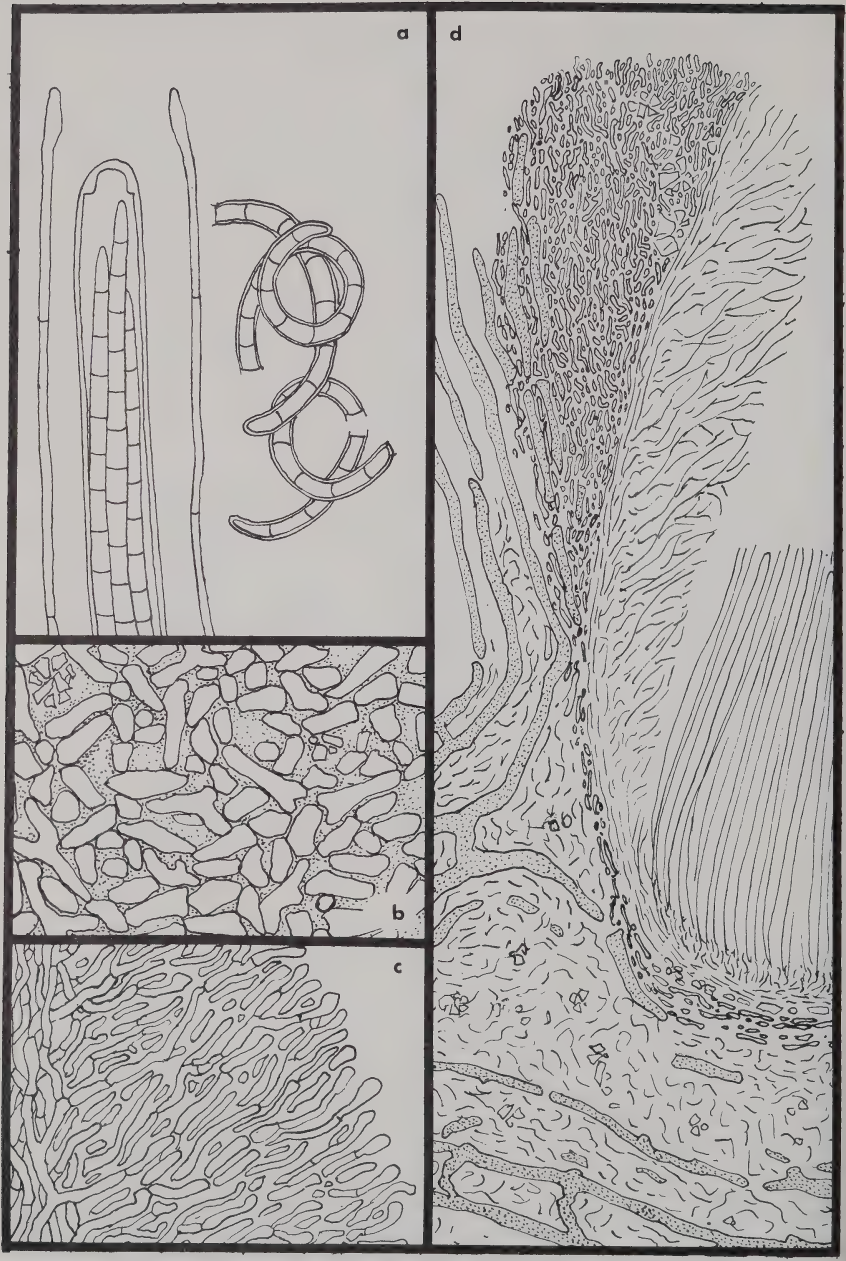

FIGURE 55. *Stictis bicolor*. a. Detail of apices of ascus, paraphyses, and spores, and coiled spore fragments, x1500. b. Wall hyphae, x750. c. Periphysoids, x750. d. Cross section of margin, x150. Drawn from the lectotype.

µm broad, somewhat tapered basally, septate, the cells 4-5 µm long. In addition to spores remaining within the ascus, the type specimen contains what appear to be broken, coiled fragments of discharged spores. Ellis and Everhart interpreted these as part-spores, but the ragged ends suggest that they are not produced by regular disarticulation at the septa. The structural details of the margin show this species to be a *Stictis* rather than a *Schizoxylon.*

Old apothecia which no longer contain hymenium are yellow rather than orange; hence the epithet *bicolor*. The species was also reported from Brazil by Starbäck (l.c.), but his description does not fit Bethel's specimens.

SPECIMENS EXAMINED: NORTH AMERICA: USA (NY, on *Salix,* Bethel 285, lectotype, designated here, of *Schizoxylon bicolor;* on Cottonwood [*Populus*], Colorado, Bethel 260, lectoparatype)

(27). STICTIS BRACHYSPORA Sacc. & Berlese, Rev. Mycol. (Toulouse) 7: 92 (1885)

≡ *Stictis radiata* subsp. *brachyspora* (Sacc. & Berl.) Sacc., Sylloge Fung. 8: 683 (1889)

Figure 56

Apothecia at first immersed, opening broadly but not becoming erumpent, 0.5-0.8 mm diam., the disc deeply immersed, pale ochraceous, splitting away from the margin when dry, the margin prominent, white-pruinose, usually entire. Margin in cross section lacking a stroma, colorless throughout, without a differentiated wall but with a prominent thalline margin, c. 40 µm thick, predominantly crystalline, lined on the inside with matted, mostly unbranched periphysoids 15 x 1.0 µm. Asci 90-120 x 6-7 (-9) µm, thick-walled when young, the cap 3.0 µm thick, pierced by a broad pore, not prominent. Paraphyses filiform, 1.0 µm thick below, scarcely enlarged above, sometimes once-branched, J+ blue at the tip. Ascospores 8, 65-90 x 3.5-4.5 µm, obscurely sheathed, septate, the cells 2-3 µm long.

The sole specimen of this species in Saccardo's herbarium does not contain any apothecia. The specimen (211) in Patouillard's herbarium deposited under this name agrees with the original description and should make a suitable neotype. *S. brachyspora* is a widespread but uncommon tropical member of the *S. radiata* complex. It is distinguished from *S. carnea* by having shorter, broader spores with shorter cells, and from *S. hawaiiensis* by the shorter spores and strong iodine reaction of the hymenium. Cultural studies, or a systematic approach to the relationship between geographical and morphological variation in this group, may ultimately provide a better species concept than the one proposed here.

SPECIMENS EXAMINED: AUSTRALASIA: New Zealand (PDD 32649, on *Lupinus,* North Island; 32651, on *Rhopadostylis, ibid*). ASIA: Viet Nam (FH-Patouillard, Duport 211, Hanoi, neotype, designated here, of *S. brachyspora;* Duport 193). AFRICA (MPU, North Africa, Maire 6792, on *Cytisus,* country unknown). SOUTH AMERICA. Venezuela (NY-Ve 741, Dumont et al, Dto. Federal)

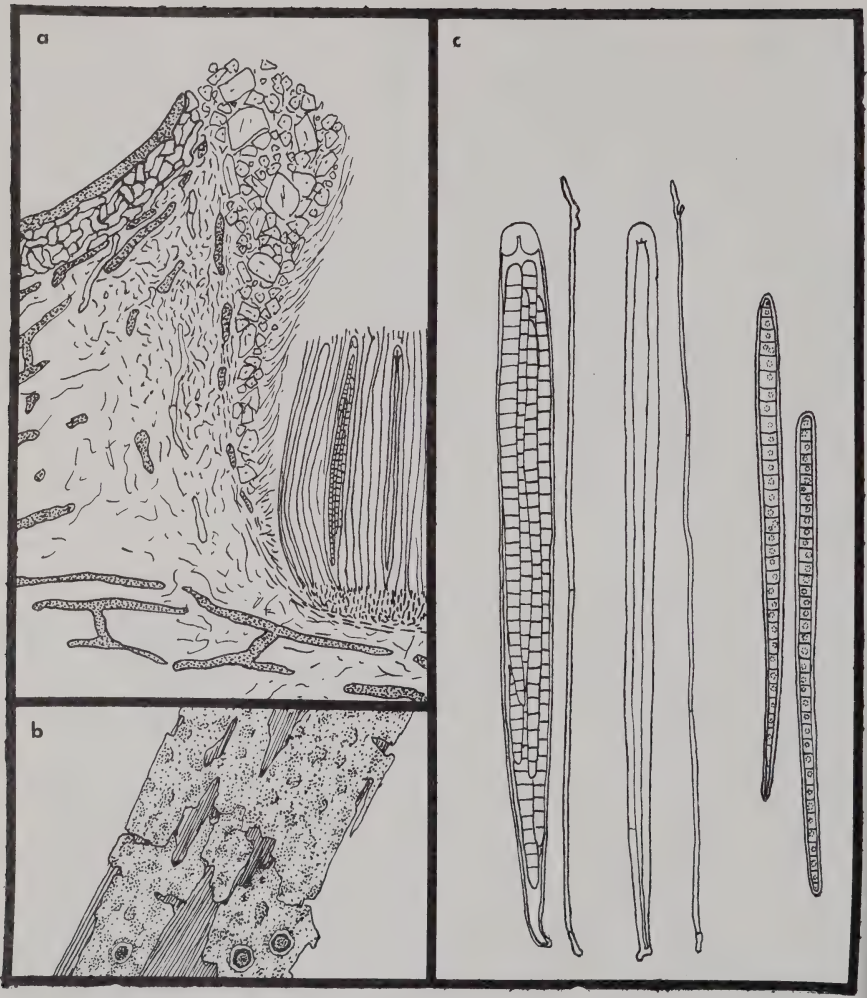

FIGURE 56. *Stictis brachyspora*. a. Cross section of margin, x300. b. Habit sketch, x7.5. c. Asci, paraphyses, and spores, x750. Drawn from the neotype.

(28). *STICTIS BROMELIAE* Starbäck
= *Stictis radiata* Pers., q.v.

(29). *(STICTIS BULLATA)* Pers., Myc. Eur. 1: 339 (1822)

This species is based on the lenticels of *Castanea vesca*. With the exception of a specimen on *Salix* (910.263-1221), which is *Propolomyces farinosus*, all of the specimens in Persoon's herbarium are lenticels.

SPECIMENS EXAMINED: EUROPE (country uncertain)(L, 910.264-885, sine coll; 910.264-839, on *Castanea vesca*, presumed holotype of *Stictis bullata*; 910.264-826, on *Fraxinus*; 910.264-836, on *Quercus*)

(30). *STICTIS CABALLEROI* Bausá Alcalde, Ann. Jardin Bot. Madrid 10: 233 (1952)

Figure 57

Apothecia at first immersed, 0.4-0.7 mm diam., opening broadly and sometimes appearing nearly superficial owing to scaling away of the surrounding epidermis, the disc dark brown, deeply urceolate, the margin grey-pruinose. Margin in cross section 80-100 µm thick, dark brown without but not stromatized, the cells of the wall closely packed, 1.5-2.0 µm diam. Crystalline layer prominent, the hyphae within it colorless and inconspicuous. Periphysoids 15 x 1.5 µm, colorless, unbranched, J-. Asci 90-120 x 7(-11) µm, the cap 1.5 µm thick, scarcely differentiated. Ascospores 8, 50-90 x 2.0 µm, septate, the cells 2.5-3.5 µm long. Paraphyses numerous, filiform, 1.0 µm thick, barely enlarged above, unbranched, colorless, J-.

On *Pithecolobium*, Spain. I have seen no material which might be referred to this species other than the type specimen. *S. lanugicincta* is similar, but has paraphyses which are brown at the tip and a less developed crystalline layer.

SPECIMEN EXAMINED: EUROPE: Spain (MA, on *Pithecolobium*, Caballero 12832, holotype of *S. caballeroi*)

(31). *STICTIS CALCERA* Phillips
= *Stictis chrysopsis* Ell. & Everh., q.v.

(32). *STICTIS CARESTIAE* (De Not.) Rehm
= *Stictis radiata* Pers, q.v.

(33). *(STICTIS CARICUM)* Auersw. in Fckl., Fungi Rhenani 1833 (nom. nud.) & Jahrb. Nassauischen Vereins Naturk. 23-24: 249 (1870) pro synon.
= *Merostictis seriata* (Libert) Défago, Sydowia 21: 49 (1967)

For complete synonymy, see Défago (1967). The species is considered to be a member of the Dermateaceae.

(34). *STICTIS CARNEA* Seaver & Waterston, Mycologia 33: 311 (1941)

Figure 58

Apothecia gregarious, 0.5-0.7 mm diam., at first immersed, opening by a pore but not becoming erumpent, the margin white-pruinose, fairly narrow, entire, the disc pale flesh-colored, deeply immersed, splitting away from the margin when dry. Margin,in cross section c. 100 µm thick, fleshy, 3-layered, the wall c. 30 µm thick, of loosely interwoven colorless hyphae 1.5 µm diam. embedded in a gelatinous matrix. Crystalline layer prominent. Periphysoids 15-30 x 1.5-2.0 µm, usually unbranched, forming a compact layer. Asci 180-220 x 5-6 µm, the cap 3 µm thick, pierced by a broad pore. Paraphyses numerous, filiform, unbranched, slightly enlarged above, J+ blue. Ascospores 8, irregularly 4-seriate, 100-120 x 3.0-3.5 µm, septate, the cells 3-4 µm

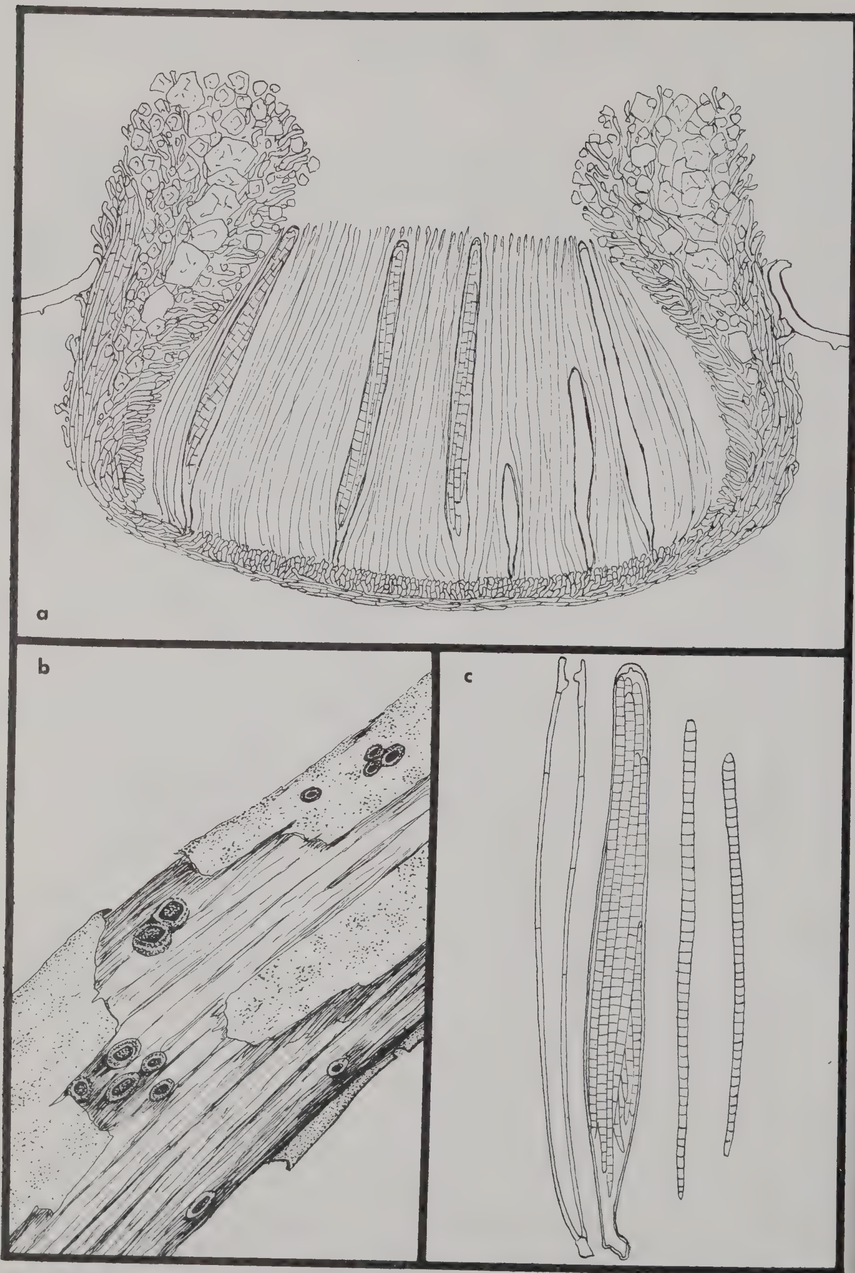

FIGURE 57. *Stictis caballeroi*. a. Cross section of apothecium, x375. b. Habit sketch, x7.5. c. Ascus, paraphyses, and spores, x750. Drawn from the holotype.

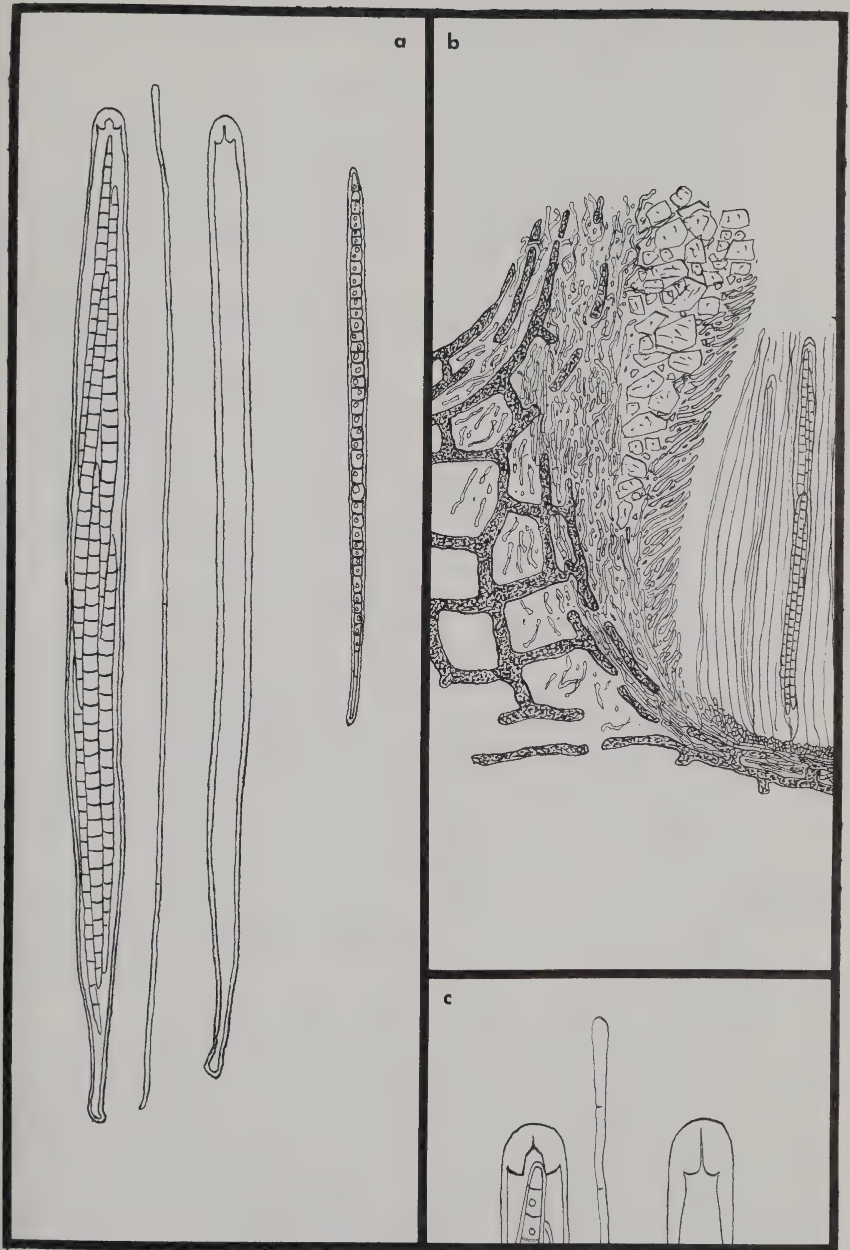

FIGURE 58. *Stictis carnea*. a. Asci, paraphysis, and spores, x750. b. Cross section of margin, x300. c. Detail of apices of asci and paraphysis, x1500. Drawn from holotype.

long, obscurely sheathed and strongly guttulate.

On dead wood, throughout the tropics. *S. carnea* is closely allied to *S. radiata* subsp. *intermedia*, from which it is distinguished by having shorter spores with a distinct basal taper, irregularly 4-seriate in the ascus, and somewhat shorter spore cells. Typical *S. radiata* differs from both in having narrower, branched periphysoids. In Seaver's type the wood surrounding the apothecia is stained pink. This color reaction was not observed in several of the other specimens, and occurs in other species as well. It may be host-mediated.

SPECIMENS EXAMINED: ASIA: Ceylon (K, Berkeley 318, on *Citrus*). Philippines (CUP-Sa-2369, Luzon). AFRICA: Union of South Africa (K, Doidge 36835, Natal; on *Citrus*, Doidge 20311, Transvaal; on *Citrus*, Wagner 33766, Natal). North Africa (country uncertain)(MPU, Maire 4040, on *Laurus*). NORTH AMERICA: Bermuda (NY, Seaver & Whetzel 5, holotype of *Stictis carnea* [an isotype at CUP contains no apothecia]). SOUTH AMERICA: Ecuador (NY-Ec 1041, Prov. Cotapaxi, Dumont, Carpenter & Buriticá, 18.VII.1975). Venezuela (NY-Ve 741, Dto. Federal, Dumont, Haines, Manara, 25.VII.1971; Ve-2534, Edo. Merida, Dumont, Haines, Samuels, Revas, 18.VII.1971; Ve-3573, Edo. Miranda, Dumont, Samuels & Manara, 2.VII.1972). Colombia (NY-Co 2022, Dpto. Antioquia, Dumont et al.; Co-118, Dto. Cundinamarca, Dumont et al.; Co-4041, Dto. Cundinamarca, Dumont et al.; Co-4048, Dto. Cundinamarca, Dumont et al.)

(35). STICTIS CARPENTERIANA Sherwood, spec. nov.

Figure 59

Ascocarpi primum immersi, profunde cupulati, 0.3-0.5 mm diam., margine lacerato, albo, disco pallide ochraceo. Margo in sectione transversali 75-80 μm crassus, siccus ab hymenio se abrumpens, hypharum pariete 1.5 μm diam., achromo. Stratum crystallinum 30-40 μm crassum. Periphysoidea 30 x 1.5 μm, non ramosa. Paraphyses filiformes, ramosae, 200 x 1.0 μm, achromae, in iodo non caerulescentes. Asci 175-200 x 3.5-4.0 μm, apice 3.0 μm crassi, 8-spori. Sporae 175-200 x 1.0 μm, cellulis 4-6 μm longis.

HOLOTYPUS: NY-Ec 17, Ca. 11 km SW of Chillogallo, on the old road from Quito to Santo Domingo, Prov. Pichincha. Elev. ca. 11,000 ft. K.P. Dumont, S. E. Carpenter, P. Buriticá, 16 July 1975.

Etymology: Named after one of the collectors.

Apothecia at first immersed in bleached, discolored areas of the host, opening by a pore but not becoming erumpent, 0.3-0.5 mm diam., the margin thick, white-pruinose, lacerate, the disc deeply immersed, pale ochraceous. Margin in cross section 75-80 μm diam., 3-layered, without a prominent accessory thalline margin, the wall 15 μm thick, colorless, of loosely interwoven hyphae 1.5 μm diam., somewhat gelatinous. Crystalline layer prominent, of rather small (mostly 10 μm or less) crystals. Periphysoids 30 x 1.5 μm, unbranched, forming a compact layer. Subhymenium 10 μm thick, of small, angular, colorless cells, J-. Paraphyses numerous, filiform, 1.0 μm broad below, branched and propoloid above, not enlarged, J-. Asci 175-200 x 3.5-4.0 μm,

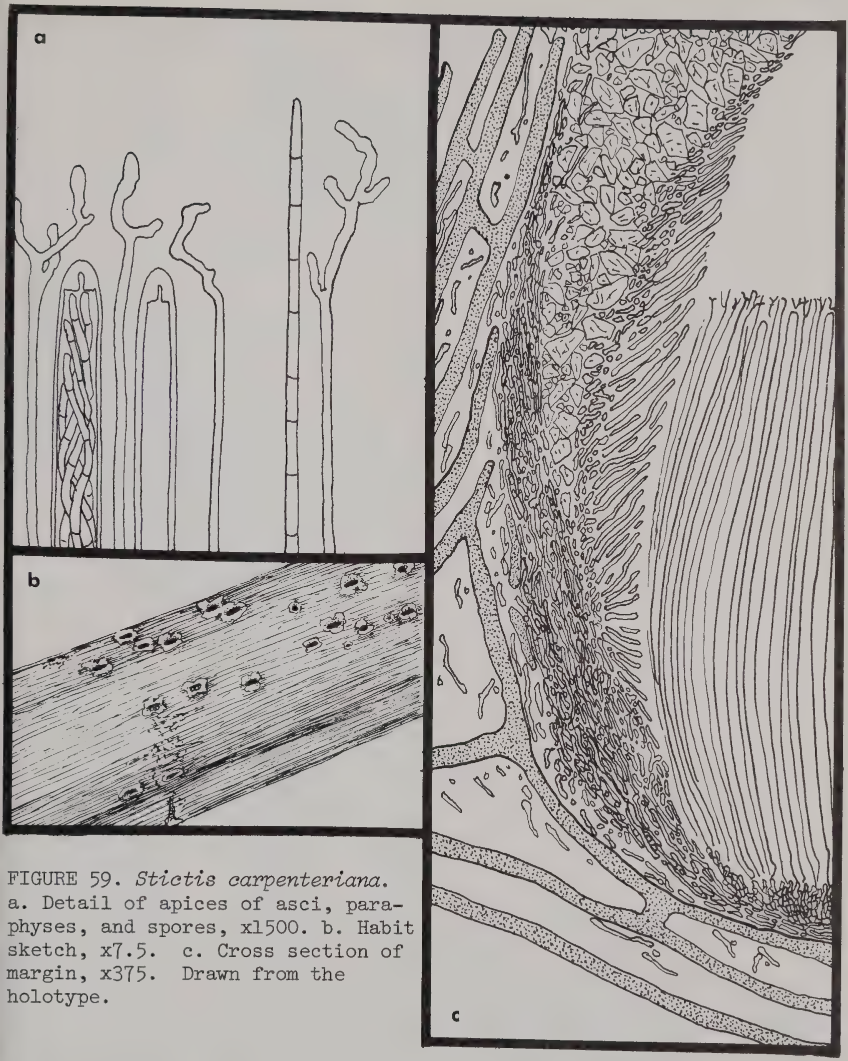

FIGURE 59. *Stictis carpenteriana.* a. Detail of apices of asci, paraphyses, and spores, x1500. b. Habit sketch, x7.5. c. Cross section of margin, x375. Drawn from the holotype.

the cap 3.0 μm thick. Ascospores 8, nearly as long as the asci, 1.0 μm broad, septate, the cells 4-6 μm long.

On an herbaceous stem. Ecuador. The dimensions of hymenial elements of *S. sarothamni* are similar, but *S. sarothamni* has a much broader margin.

SPECIMEN EXAMINED: See holotype, above.

(36). STICTIS CAULINCOLA Schw., Trans. Amer. Philos. Soc. n.s. 4: 179 (1832)
≡ *Phragmonaevia caulincola* (Schw.) Sacc., Sylloge Fung. 8: 676 (1889)

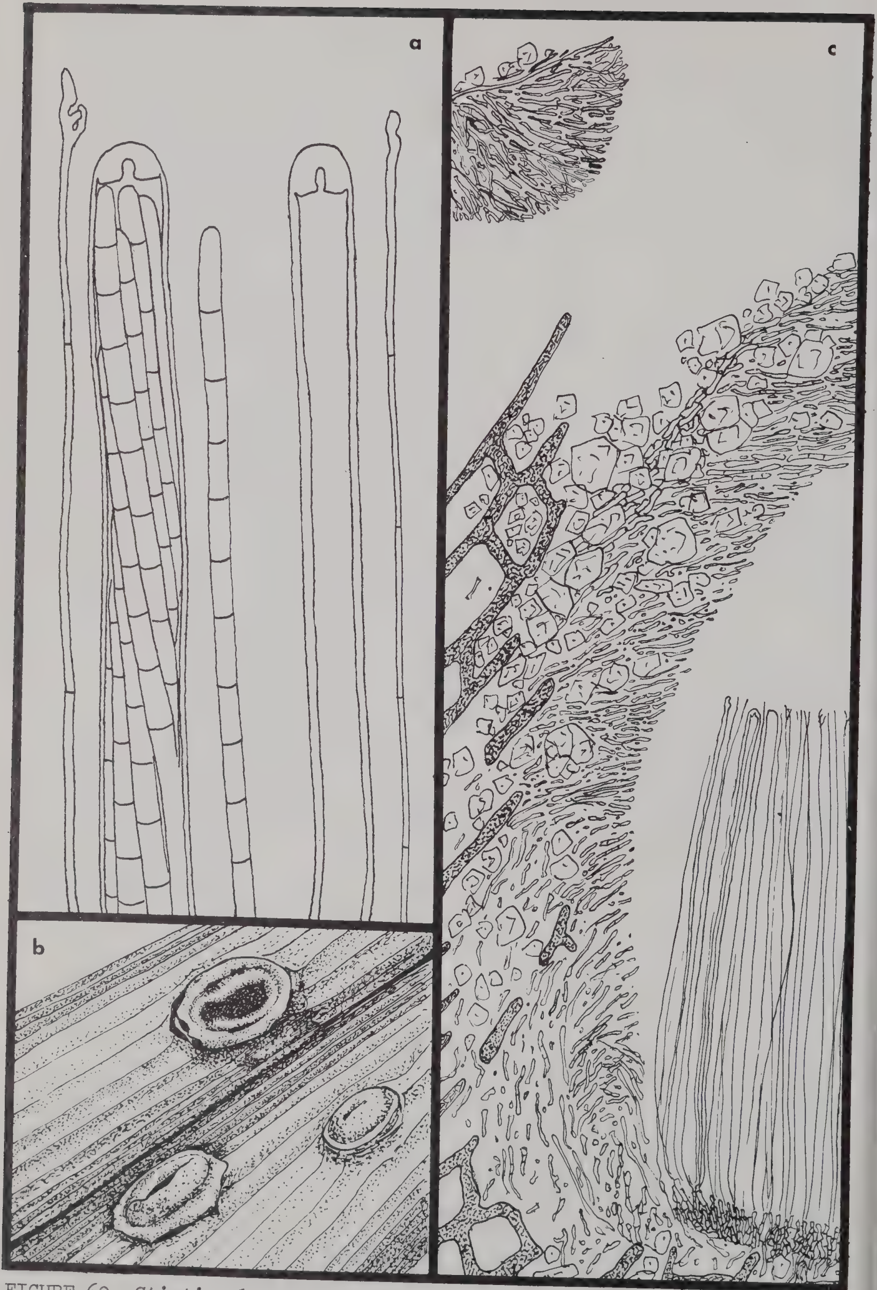

FIGURE 60. *Stictis chrysopsis*. a. Detail of apices of asci, paraphyses, and spores, x1500. b. Habit sketch, x7.5. c. Cross section of margin, x225. Drawn from CUP-D-7604.

≡ Leptosphaeria caulincola (Schw.) Sherwood, comb. nov.

The type is a minute, immersed *Leptosphaeria* with thin-walled, ostiolate pseudothecia 250 µm in diameter and 3-septate, brown ascospores 18-20 x 3-4 µm, the second cell from the top largest.

SPECIMEN EXAMINED: NORTH AMERICA: USA (PH, holotype of *Stictis caulincola* ex herb. Schweinitz, sine coll.)

(37). (STICTIS CERACEA) Schw., Trans. Amer. Philos. Soc. n. s. 4: 180 (1832)

The type is a pycnidial fungus, immersed, opening by a minute white-bordered pore 100 µm diam., with a single cavity, the wall colorless, lined with simple conidiophores and hyaline, 3-septate conidia 40 x 2.0 µm.

SPECIMEN EXAMINED: NORTH AMERICA: USA (PH, sine coll., holotype of *Stictis ceracea* ex herb. Schweinitz)

(38). (STICTIS CHILENSIS) Speg., Contrib. Estud. Hongos Chilensis 129 (1910)
= *Propolis quadrifida* (Lév.) Mont.

For a discussion of this species, a member of the Phacidiales, see Sherwood (1977).

(39). (STICTIS CHRYSOPHAEA) (Pers.) Pers., Myc. Eur. 1: 335 (1822)
≡ *Peziza chrysophaea* Pers., Syn. Meth. Fung. 649 (1801)
≡ *Schmitzomia chrysophaea* (Pers.) Fr., Summa Veg. Scand. sect. post. 363 (1849)
≡ *Ocellaria chrysophaea* (Pers.) Rehm in Rabenh., Krypt.-Fl. ed. 2, 1(3): 135 (1888)
≡ *Propolis chrysophaea* (Pers.) Phil., Brit. Discom. 376 (1887)
≡ *Ramonia chrysophaea* (Pers.) Vězda, Folia Geobot. Phytotax. 2: 166 (1966)

Additional synonyms are given by Vězda (1966). No material of this species remains in either Persoon's or Fries's herbarium. Vězda (l.c.) neotypified *Stictis chrysophaea* with a specimen in Nylander's herbarium, and on this basis transferred the species to *Ramonia*. This neotype contains four apothecia; I did not examine it microscopically. Neither its external appearance nor the description furnished by Vězda suggest that this is a *Stictis*.

The fungus illustrated by Persoon (1803-1806) more closely resembles *Stictis friabilis* (q.v.) than *Ramonia chrysophaea*, but, in the absence of conclusive evidence as to the identity of the species, I chose to accept Vězda's neotypification. Rehm (1887-96) and Phillips (1887) provide two additional interpretations of the species.

(40). *STICTIS CHRYSOPSIS* Ell. & Everh., Proc. Acad. Nat. Sci. Philadelphia 46: 353 (1894)
= *Stictis calcarea* Phil., in herb.
= *Stictis calcera* Phil. in Harkness & Moore, Cat. Pacific Fungi 39 (1880), nom. nud. (lapsus calami

for *calcarea?*)

Figure 60

Apothecia at first immersed, remaining for a long time closed and covered by a dome-shaped white-pruinose peridium which separates from the surrounding wood, finally opening by a longitudinal slit (rarely by a pore), 1.5-2.5 mm diam., with an annulate margin and dark ochraceous disc. Margin in cross section consisting of slender periphysoids 50 x 1.5 µm, branched, imbedded in a gelatinous matrix. There is no defined wall, and the crystalline layer separates from the surrounding wood before the apothecia mature. The hyphae of the crystalline layer are pale brown.

Subhymenium colorless, 10-15 µm thick, of small, colorless , angular cells, J-. Paraphyses numerous, filiform, 1.0 µm thick below, enlarged to 2.0 µm at the apex, often branched. Asci 300 x 6-7 µm, the cap 3.0 µm thick. Ascospores 8, 250-275 x 2.0 µm, septate, the cells 5-7 µm long.

On a variety of woody plants, western North America. Apparently characteristic of dry interior regions; I have seen no material from the coastal fog belt.

SPECIMENS EXAMINED: NORTH AMERICA: USA (NY, on *Ceanothus,* Suksdorf 309, holotype of *Stictis chrysopsis*, Washington state; On *Corylus,* Washington state, Piper 9.XI.1892) (K, on Willow or Osier, Phillips 945, sine loc., labelled *S. calcarea*)(CUP-D-7604, Suksdorf 309, isotype; D-7602, on willow, Tehatchepi, California, Harkness 3503, labelled *S. calcera*)(Herb. Sherwood 2013, on *Corylus,* Oregon; 2012, on *Rosa,* Oregon)(Herb. W.B. Cooke 50394, on *Arctostaphylos*, California)

(41). (STICTIS CINERASCENS) Pers., Myc. Eur. 1: 339 (1822)
= *Propolomyces farinosus* (Pers.) Sherwood

The above synonymy is taken from the literature (cfr. Rehm, 1887-96). For a discussion of the species, see Sherwood (1977).

(42). (STICTIS CIRCINATA) Libert, Plant. Crypt. Ard. 232 (1833)
≡ *Merostictis circinata* (Libert) Défago, Sydowia 21: 54 (1967)

Additional synonyms, and a description of the species, a member of the Dermateaceae, are provided by Défago (1967).

(43). (STICTIS CLADONIAE) (Rehm) Sacc., Sylloge fung. 8: 692 (1889)
≡ *Schmitzomia cladoniae* Rehm, Hedwigia 21: 116 (1882)

Figure 61

Stictis cladoniae , with a thick, fleshy, pseudoparenchymatous margin which is completely free from the substrate, and asci which appear bitunicate rather than Ostropalean, cannot readily be assigned to any existing genus (R. Santesson, *personal communication*). It does not seem to be Ostropalean.

SPECIMEN EXAMINED: EUROPE: Austria (S, on *Cladonia,* Rehm, holotype of *S. cladoniae*).

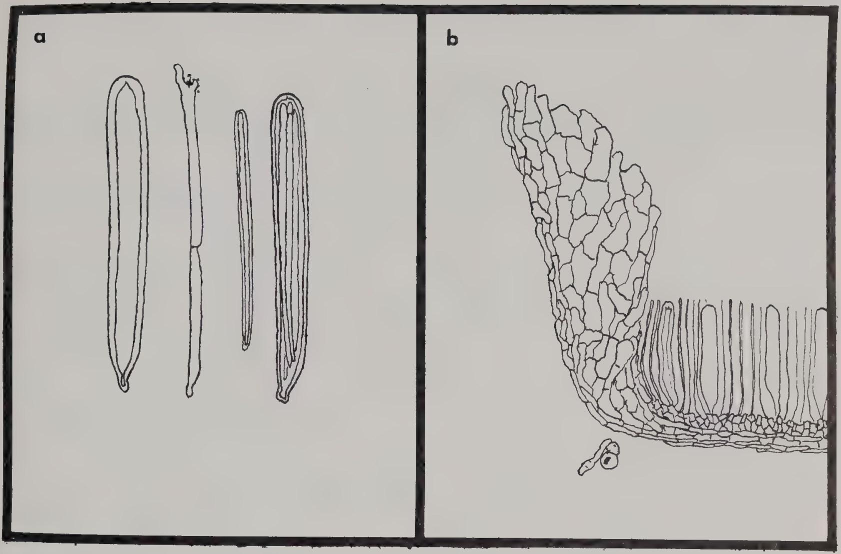

FIGURE 61. *Stictis cladoniae*. a. Asci, paraphysis, and spores, x750. b. Cross section of margin, x375. Drawn from the holotype.

(44). (STICTIS COCCINEA) Fr., Elenchus Fung. 2: 24 (1828)
≡ *Ocellaria coccinea* (Fr.) Rehm in Rabenh., Krypt.-Fl. ed. 2, 1(3): 136 (1888)

The holotype specimen in Fries's herbarium is immature Hypocrealean stroma. Nannfeldt (1929) suggests that this is *Nectria* cfr. *verrucosa* (Schw.) Sacc.

SPECIMEN EXAMINED: EUROPE (UPS, on *Morus*, Chaillet in herb. Fries, holotype of *Stictis coccinea*)

(45). (STICTIS COCCOLOBI) Seaver & Waterston, Mycologia 38: 399 (1941)
= *Propolis quadrifida* (Lév.) Mont.

This species is discussed by Sherwood (1977).

(46). STICTIS COFFEICOLA Averna-Saccá, Segundo Contrib. Estudo Molestias Crypt. Cafeeiro 31 (1925)

I was unable to locate any material, type or otherwise, which had been identified as this species. The original description is phytopathological in orientation and includes little morphological detail. *S. coffeicola* was described as having an olivaceous, white-pruinose margin and ascospores 81-135 x 2.0 µm. The illustrations suggests that this is indeed a *Stictis* and is not *S. radiata*. I am unable to characterize it further.

(47). (STICTIS COMPRESSA) Ell. & Everh.
= *Robergea cubicularis* (Fr.) Rehm, q.v.

(48). (STICTIS CONICOLA) (Hazsl.) Hazsl., Verh. Zool.-Bot. Ges. Wien 37: 152 (1887)
≡ *Stictis stellata* β *conicola* Hazsl., Mat. Természettud Közlem. 21: 181 (1881)
= *Lasiostictis fimbriata* (Schw.) Bäuml.

For full synonymy and a discussion of the species, a member of the Phacidiaceae, see Sherwood (1974).

(49). (STICTIS CONIGENA) Sacc. & Berl., Atti Reale Ist. Veneto Sci., Lett., Arti vi, 3: 734 (1885)
= *Lasiostictis fimbriata*(Schw.) Bäuml.

For a full synonymy and discussion of the species, see Sherwood (1974).

(50). (STICTIS CONOCARPI) Seaver & Waterston, Mycologia 33: 311 (1941)
= *Propolis quadrifida* (Lév.) Mont.

For a discussion of this species, see Sherwood (1977)

(51). (STICTIS CONVALLARIAE) Mont. & Cesati in Mont., Syll. Gen. Sp. Crypt. 197 (1856)
≡ *Phragmonaevia convallariae* (Mont. & Ces.) Sacc., Sylloge Fung. 8: 676 (1889)

No type material of this species could be located at PC or FH. The original description suggests to me that this is probably a species of *Pyrenopeziza*, but will not serve to characterize it fully. Roumeguère's specimen, cited below, is a poorly-preserved specimen of a *Pyrenopeziza*

SPECIMEN EXAMINED: EUROPE: France (CUP-D-11691, Roumeguère, Fungi Gallici Exs. 6693, on *Polygonatum*)

(52). (STICTIS CORDOBENSIS) Speg.
≡ *Schizoxylon cordobensis* (Speg.) Sherwood, q.v.

(53). STICTIS CORII (Schw.) Sacc.
= *Stictis radiata* Pers., q.v.

(54). (STICTIS CORRUGATA) Speg., Bol. Acad. Nac. Ci. 24: 163 (1926)

I requested the type from LPS but did not receive it. According to the original description, the specimen had a fleshy, white margin, shallowly cupulate olivaceous disc, scarcely thickened asci, and spores about 150 x 1.5-2.0 μm. The ascus membrane was said to blue in iodine and the spores to disarticulate at the septa. This is probably a *Schizoxylon* rather than a *Stictis*. As indicated in the notes under *Schizoxylon cordobensis*, above, ascospore measurements of other *Stictis* spp. described in the same publication where *S. corrugata* appeared are incorrect.

(55). STICTIS CORTICOIDES Pat.

≡ *Karstenia corticoides* (Pat.) Sherwood, q.v.

(56). STICTIS CORYLI Crouan & Crouan, Fl. Finist. 42 (1867)

The type of this species, if extant, cannot be borrowed, and the original description will not characterize the species.

(57). (STICTIS CORYNESPORA) Mont., Ann. Sci. Nat. Bot. sér. 3, 5: 372 (1856)

I requested the type from PC, but they were anable to locate it. According to the original description *S. corynespora* had long clavate spores containing 24-36 "nucleolos" or "sporules" and grew on a sterile lichen thallus. This is almost certainly an *Ocellularia.*

(58). (STICTIS CRASSISPORA) Speg.
≡ *Schizoxylon crassisporum* (Speg.) Sherwood, q.v.

(59). (STICTIS CRATERIUM) Mont., Ann. Sci. Nat. Bot. sér. 2, 11: 42 (1849) pro synon., nom. superfl?
≡ *Sphaeria hederae* Sowerby, Engl. Fungi t. 371, f. 5 (1802)

Montagne (l.c.), in a discussion of Castagne's species of *Sphaeria*, synonymizes *"Sphaeria hederae* Cast." with *"Stictis craterium* Mont. hb." and *Peziza insidiosa* Desm. It is unclear whether the name is based on *Sphaeria craterium* DC., with which *Peziza insidiosa* has been synonymized. *Sphaeria hederae* is not, however, a Castagne species, but was first published by Sowerby and was ascribed to him by Castagne (1845). Sowerby's illustration and description are ambiguous; without reference to an original collection it is impossible to tell whether *Sphaeria hederae* is an older name for *Sphaeria craterium.*

(60). (STICTIS CRUENTATA) Mont., Ann. Sci. Nat. Bot. sér. 4, 3: 96 (1855)
≡ *Melittosporium cruentatum* (Mont.) Sacc., Sylloge
≡ Fung. 8: 704 (1889)
≡ Tryblidium cruentatum (Mont.) Sherwood, comb. nov.

Figure 62

Apothecia gregarious, immersed in a lichen thallus on smooth bark, 1.0-1.5 mm diam., orbicular, the thick, conspicuously reddish-pruinose margin splitting into lobes and splitting away from the substrate. Margin in cross section brown, of hyphae with a distinct inward orientation, interspersed with a few crystals but without a definite crystalline layer. Paraphyses numerous, simple, J-, with free ends. Asci 80-100 x 12(-20) μm, thick-walled when young, possibly bitunicate, J-. Ascospores 8 or fewer, 30 x 10 μm, muriform, with a rounded cell lumen, J-, with a distinct sheath.

If one accepts that the apothecia belong with the lichen thallus, then the species will key to *Thelotrema,* but the apothecia seem to originate deeper in the substrate.

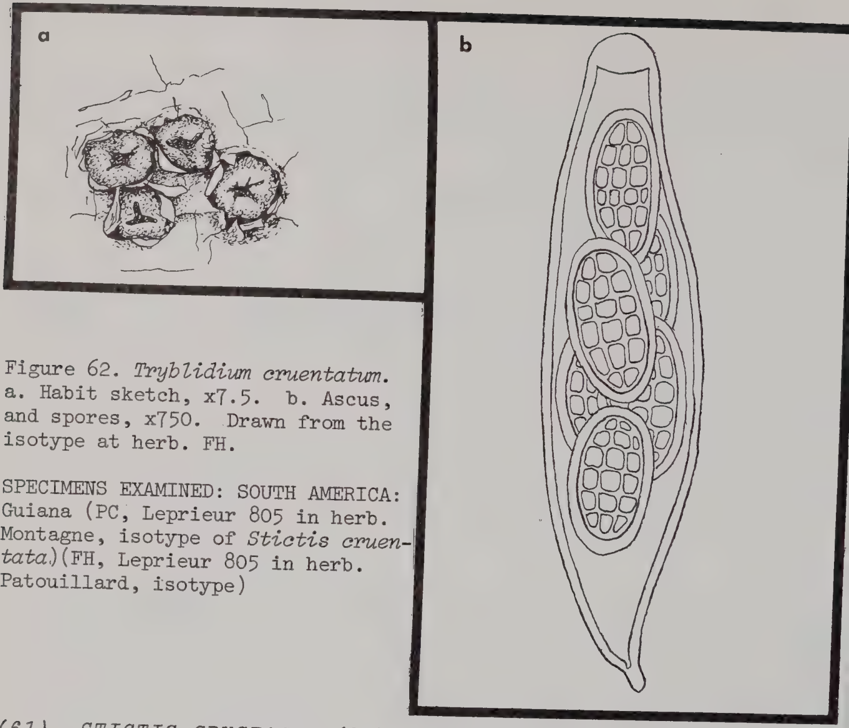

Figure 62. *Tryblidium cruentatum*. a. Habit sketch, x7.5. b. Ascus, and spores, x750. Drawn from the isotype at herb. FH.

SPECIMENS EXAMINED: SOUTH AMERICA: Guiana (PC, Leprieur 805 in herb. Montagne, isotype of *Stictis cruentata*)(FH, Leprieur 805 in herb. Patouillard, isotype)

(61). *STICTIS CRUSTACEA* (Schw.) Sacc.
= *Stictis sphaeroboloidea* (Schw.) Berk., q.v.

(62). *STICTIS CURTISPORA* Dearness
= *Stictis schizoxyloides* Ell. & Ev., q.v.

(63). *(STICTIS CYDONIAE)* Schulzer von Müggenberg, Verh. K. K. Zool.-Bot. Ges. Wien 21: 1250 (1871)

The type specimen could not be located at either WU or BP. Schulzer (l.c.) could find no asci or spores in this species. It cannot be characterized from the original description.

(64). *(STICTIS DECIDUA)* Ell. & Everh., Bull. Torrey Bot. Club 10: 76 (1883)
≡ *Propolis decidua* (Ell. & Everh.) Sacc., Sylloge Fung. 8: 653 (1889)

The apothecia which I sectioned no longer contained any intact asci or spores. The general aspect of the species is that of a *Xylogramma*, rather than a *Stictis* or a *Propolomyces*.

SPECIMEN EXAMINED: NORTH AMERICA: USA (CUP-D-76?9, on *Pinus*, New Jersey, isotype of *Stictis decidua*)

(65). *(STICTIS DECIPIENS)* (Karst.) Karst.

= = *Schizoxylon berkeleyanum* (Dur. & Lév.) Fckl. subsp. *decipiens* (Karst.) Karst., q.v.

(66). STICTIS DENNISII Sherwood, spec. nov.

Figure 63

Ascocarpi primum immersi, profunde cupulati, 0.5-1.0 mm diam., margine lacerato, albo, disco pallide ochraceo. Margo in sectione transversali 200 µm crassus, siccus ab hymenio se abrumpens, hypharum pariete 1.0 µm diam., achromo vel pallide brunneo. Stratum crystallinum 150 µm crassum. Periphysoidea 25-30 x 1.0 µm, ramosa. Paraphyses filiformes, simplices, 400 x 1.0 µm, apice ad 1.5 µm incrassatae, achromae, in iodo non caerulescentes. Asci 350-400 x 7.5-8.0 (-10) µm, apice 8 m crassi, 8-spori. Sporae 300-350 x 3.0 µm, vagina gelatinosa involutae, cellulis 3-4 µm longis.

HOLOTYPUS: K, Venezuela Fungi 1656, Caracas, R. W. G. Dennis 14.VI.1956)

Etymology: Named after the collector.

Apothecia immersed, not becoming erumpent, opening by a pore, the margin thick, white-pruinose, lacerate, the disc deeply urceolate, pale ochraceous, splitting away from the margin when dry. Ascocarps 0.5-1.0 mm diam. Margin in cross section 200 µm thick. Wall colorless or very pale brown, 10 µm thick, of hyphae 1.0 µm diam. Crystalline layer occupying most of the breadth of the margin, of coarse, irregular crystals. Periphysoids 25-30 x 1.0 µm, branched, imbedded in a gelatinous matrix, J-. Paraphyses numerous, simple, 1.0 µm diam. below, enlarged to 1.5 µm at the apex, J-. Asci 350-400 x 7.5-8.0 (-10) µm, very thick-walled when young, the cap 8.0 µm thick. Ascospores 8, 300-350 x 3.0 µm, sheathed, coiling when free from the ascus, septate, the cells 3-4 µm long.

On small twigs and herbaceous stems, Venezuela and Panama. The long ascospores and very thick ascus cap distinguish this species from any member of the *S. radiata* complex.

SPECIMENS EXAMINED: (see also holotype, above) NORTH AMERICA: Panama (NY-Pa 1403, Prov. Panamá, K.P. Dumont, S.E. & S.M. Carpenter, 29.VI. 1975; Pa-1374, *ibid.*; Pa-1398, *ibid.*; Pa-1079, Prov. San Blas, K.P. Dumont, S.E. & S.M. Carpenter, 23.VI.1975)

(67). STICTIS DICKSONIAE Sherwood, spec. nov.

Figure 64

Ascocarpi primum immersi, profunde cupulati, 0.2-0.5 mm diam., margine integro vel lacerato, albo, disco brunneo. Margo in sectione transversali 40 µm crassus, siccus ab hymenio se abrumpens, hypharum pariete 1.5 µm diam., brunneo. Stratum crystallinum 30 µm crassum. Periphysoidea 5 x 1.5 µm, non ramosa. Paraphyses filiformes, simplices, 475 x 1.0 µm, pallide brunneae, in iodo non caerulescentes. Asci 400-475 x 5-6 µm, apice 6-7 µm crassi, 8-spori. Sporae 375-450 x 2.0 µm, cellulis 2.5-4 µm longis.

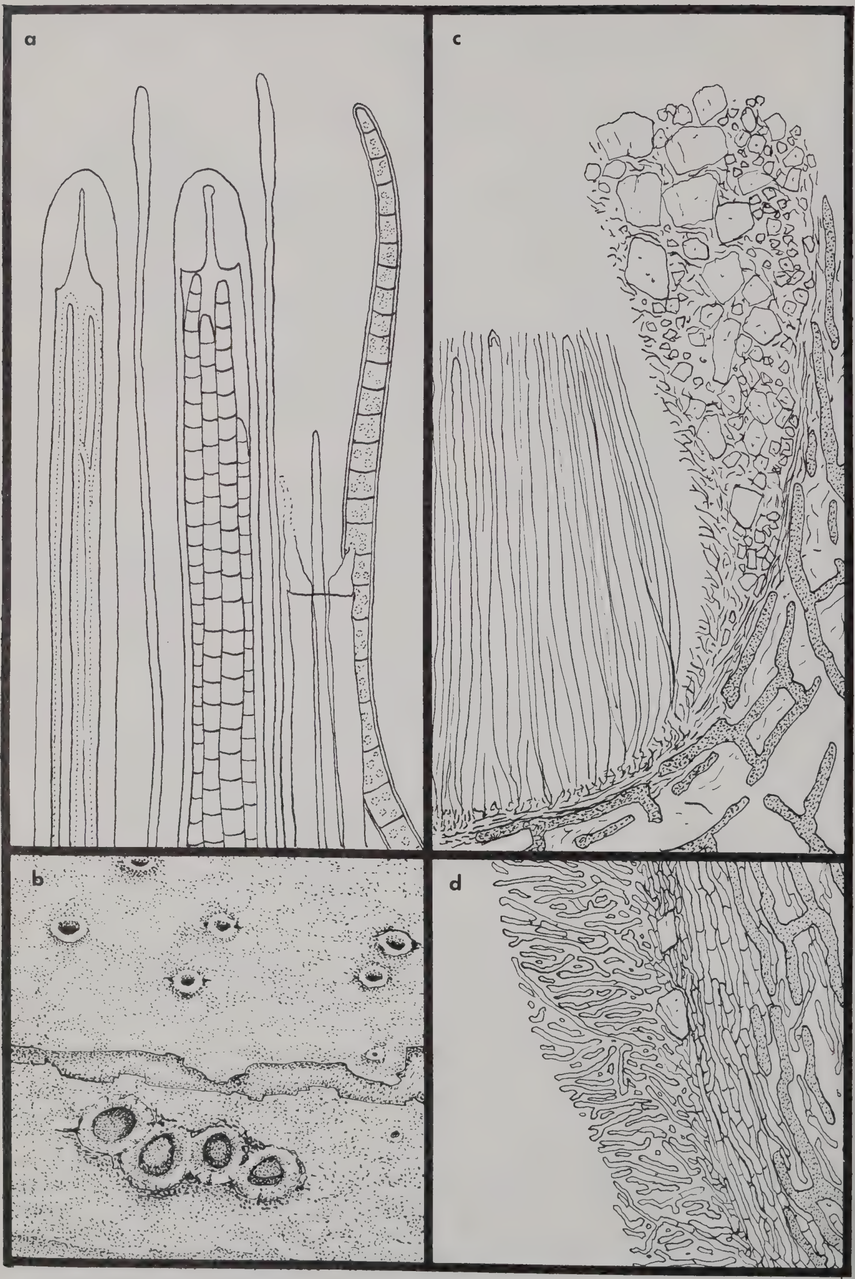

FIGURE 63. *Stictis dennisii*. a. Detail of apices of asci, paraphyses, and spores, x1500. b. Habit sketch, x7.5. c. Cross section of margin, x150. d. Wall and periphysoids, x750. Drawn from the holotype.

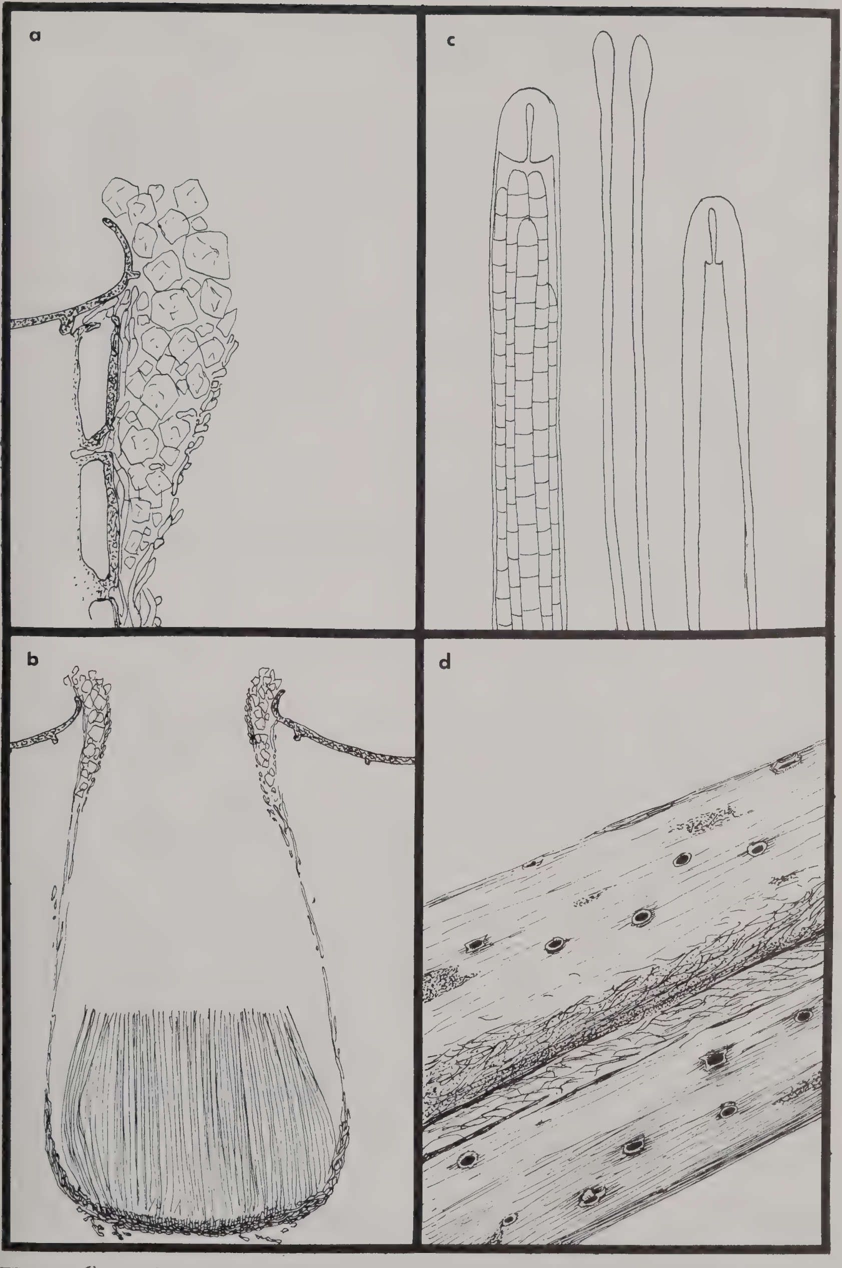

FIGURE 64. *Stictis dicksoniae.* a. Cross section of margin near the summit, x750. b. Cross section of apothecium, x75. c. Detail of apices of asci, paraphyses, and spores, x1500. d. Habit sketch, x7.5. Drawn from the holotype.

HOLOTYPUS: PDD 32648, on stipes of *Dicksonia squarrosa* near track, Horseshoe Bay, Stewart Island, New Zealand, J. M. Dingley, 17 Feb. 1954.

Apothecia at first immersed, opening by a pore, not becoming erumpent, 0.2-0.5 mm diam., somewhat elongate in outline, with a narrow, entire to stellate, whitish-grey border and very deeply urceolate brown disc. Margin,in cross section 40 µm thick at the broadest point, nearly obsolete below, the wall consisting of 4-5 layers of interwoven brown hyphae 1.5 µm diam., the crystalline layer moderately prominent, the periphysoids 5 x 1.5 µm, unbranched, sparse. Subhymenium 5-10 µm thick, J-, of small angular cells resting on a continuation of the brown wall. Paraphyses numerous, filiform, 1.0 µm thick below, enlarged to 1.5-2.0 µm above, faintly brown, J-. Asci 400-475 x 5-6 µm, the cap 6-7 µm thick, pierced by a narrow pore. Ascospores nearly as long as the asci, strictly filiform, 2.0 µm broad, septate, the cells 2.5-4 µm long.

On a fern stalk, New Zealand. This species is distinctive because it is taller than broad and seems transitional to *Robergea*. It differs from *R. canariense* in having a strictly vertical orientation, opening by a pore, and having brown paraphyses and more closely-septate spores.

SPECIMEN EXAMINED: See holotype, above.

(68). (STICTIS DISPAR) Pers. in Gaudichaud, Voyage d l' Uranie 178 (1826)

I was unable to locate any material, original or otherwise, of this species, which occurred on trunks of trees and had elongate to irregular, cinereous grey, pruinose fruitbodies. The species cannot be characterized from the original description. It may have been a lichen.

(69). (STICTIS DRYOPHILA) Cooke & Ellis, Grevillea 5: 33 (1876)

Apothecia immersed in discolored patches on bark of small twigs, not obviously associated with a lichen thallus, 1.0-1.5 mm diam., with a lacerate pruinose margin and shallowly cupulate, ochraceous disc. Paraphyses numerous, filiform, with free ends, J+ blue. Asci cylindrical, capitate, not bitunicate, 200 x 20 µm, containing 8 or fewer, long-fusiform ascospores 180 x 12 µm, septate, the cell lumen lenticular, the inner wall turning blue (not red) in iodine.

Known from two fragmentary collections. Goree (*personal communication*) found muriform spores in the type. *S. dryophila* is no *Stictis* and may merely represent fragmentary and poorly-preserved apothecia of a Thelotremataceous lichen.

SPECIMENS EXAMINED: NORTH AMERICA: USA (NY, Ellis herb., on oak limbs, New Jersey, 2346, holotype of *Stictis dryophila*)(CUP-D-7611, isotype; D-7612, on oak, Newfield, New Jersey, Ellis [immature])

(70). STICTIS DUMONTII Sherwood, spec. nov.

Fig. 65

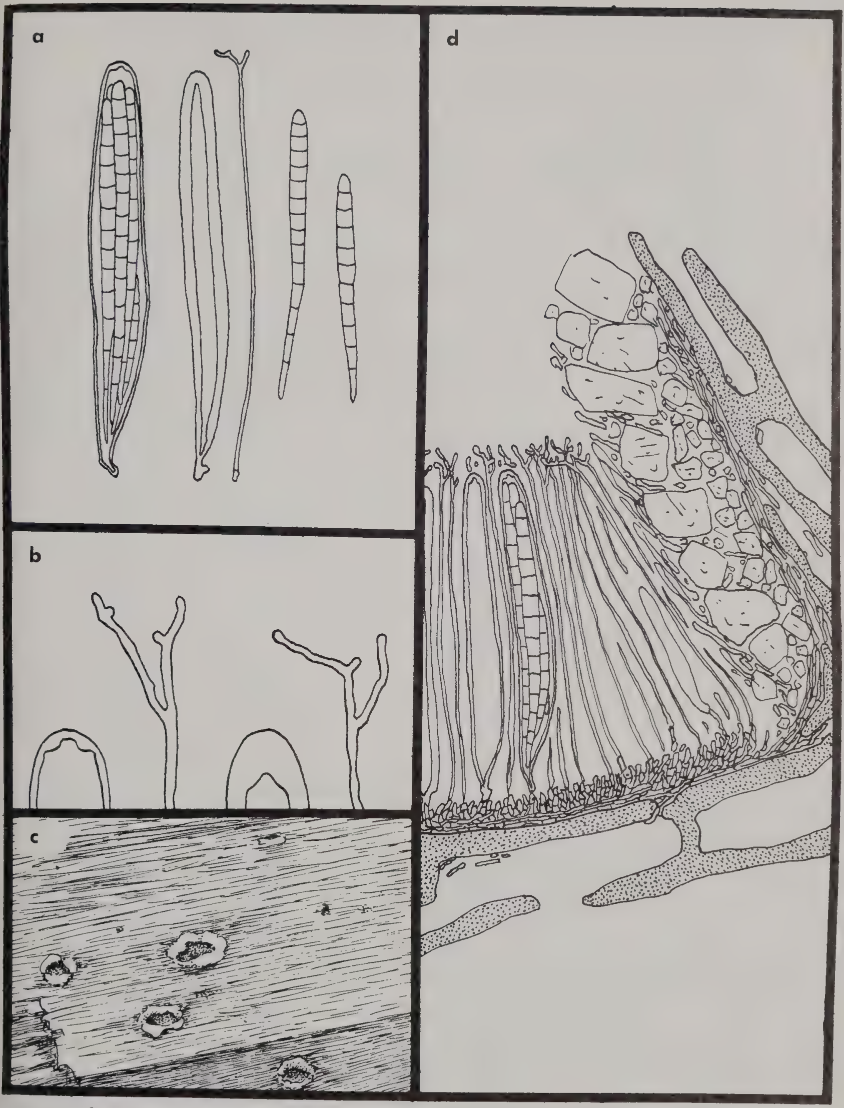

FIGURE 65. *Stictis dumontii.* a. Asci, paraphysis, and spores, x750. b. Detail of apices of asci and paraphyses, x1500. c. Habit sketch, x7.5. d. Cross section of margin, x750. Drawn from the holotype.

Ascocarpi primum immersi, profunde cupulati, 0.3-0.6 mm diam., margine integro vel lacerato, albo, disco pallide ochraceo. Margo in sectione transversali 40 µm crassus, siccus ab hymenio se abrumpens, hypharum pariete 2.0 µm diam., achromo. Stratum crystallinum 10 µm crassum. Periphysoidea

10 x 2.0 µm, non ramosa. Paraphyses filiformes, ramosae, 65 x 1.0 µm, achromo, in iodo non caerulescentes. Asci 65-70 x 7(-10) m, apice 2.0 m crassi, 4-spori. Sporae 55-65 x 3-3.5 µm, vagina gelatinosa involutae, cellulis 3-5 µm longis.

HOLOTYPUS: CUP-Vz-4387, on giant fern rachides, Rancho Grande, Aragua, Venezuela, K. P. Dumont, June 15, 1968.

Apothecia at first immersed, opening by a pore but not becoming erumpent, somewhat irregular in outline, 0.3-0.6 mm diam., with a narrow, entire to lacerate, white-pruinose margin and deeply sunken, pale ochraceous disc. The hymenium does not obviously split away from the margin because the asci are so short. Margin in cross section 40 µm thick, crystalline nearly to the base, the wall 10 µm thick, of colorless hyphae 1.5 µm diam. Periphysoids 10 x 2.0 µm, unbranched, not numerous. Paraphyses filiform, 1.0 µm thick, branched and propoloid at the apex, J-. Asci 65-70 x 7(-10) µm, the cap 2.0 µm thick, not prominent. Ascospores 4, 55-65 x 3-3.5 µm, the cells 3-5 µm long.

On stipes of a fern, Venezuela. *S. dumontii* differs from *S. javanica,* the most morphologically similar species, in having 4-spored asci, broader spores, and larger fruit-bodies.

SPECIMEN EXAMINED: See holotype, above.

(71). STICTIS EDWINIAE Clements
= *Stictis schizoxyloides* Ell. & Everh., q.v.

(72). STICTIS ELEGANS Grelet, Bull. Soc. Mycol. France 13: 206 (1926)

I was unable to locate type or reliably identified material under this name. According to the original description, the apothecia were gregarious to scattered, emergent, grey, at first subglobose and closed, then opening by teeth, 0.3-0.6 mm broad, with a white margin and waxy, white to pale disc. Asci 75-100 x 10-12 µm, terete-fusoid, blueing at the apex. Paraphyses numerous, enlarged at the apex to 2-3 µm. Spores cylindrical, 20-70 x 2.5-4.0 µm, 8-16 septate. On *Pinus* and *Calycotomes*, France. I have seen no *Stictis* specimen that would fit this description.

(73). STICTIS ELEVATA (Karst.) Karst., Acta Soc. Fauna Fl. Fenn. 2(6): 166 (1885)
≡ *Schmitzomia elevata* Karst., Fungi Fennici 932 (1870)
= *Schmitzomia atro-alba* Phill. & Plowright in Phil., Brit. Discom. 379 (1887)
  ≡ *Stictis atro-alba* (Phil. & Plowr.) Sacc., Sylloge Fung. 8: 684 (1889)
= *Stictis radiata* subsp. *minuscula* Karst., Meddel. Soc. Fauna Flora Fenn. 11: 138 (1884)

Figure 66

Apothecia at first immersed, opening by a pore, not becoming erumpent, 0.3-0.5 mm diam., the margin grey, inconspicuous and not obviously pruinose, the disc brown, deeply

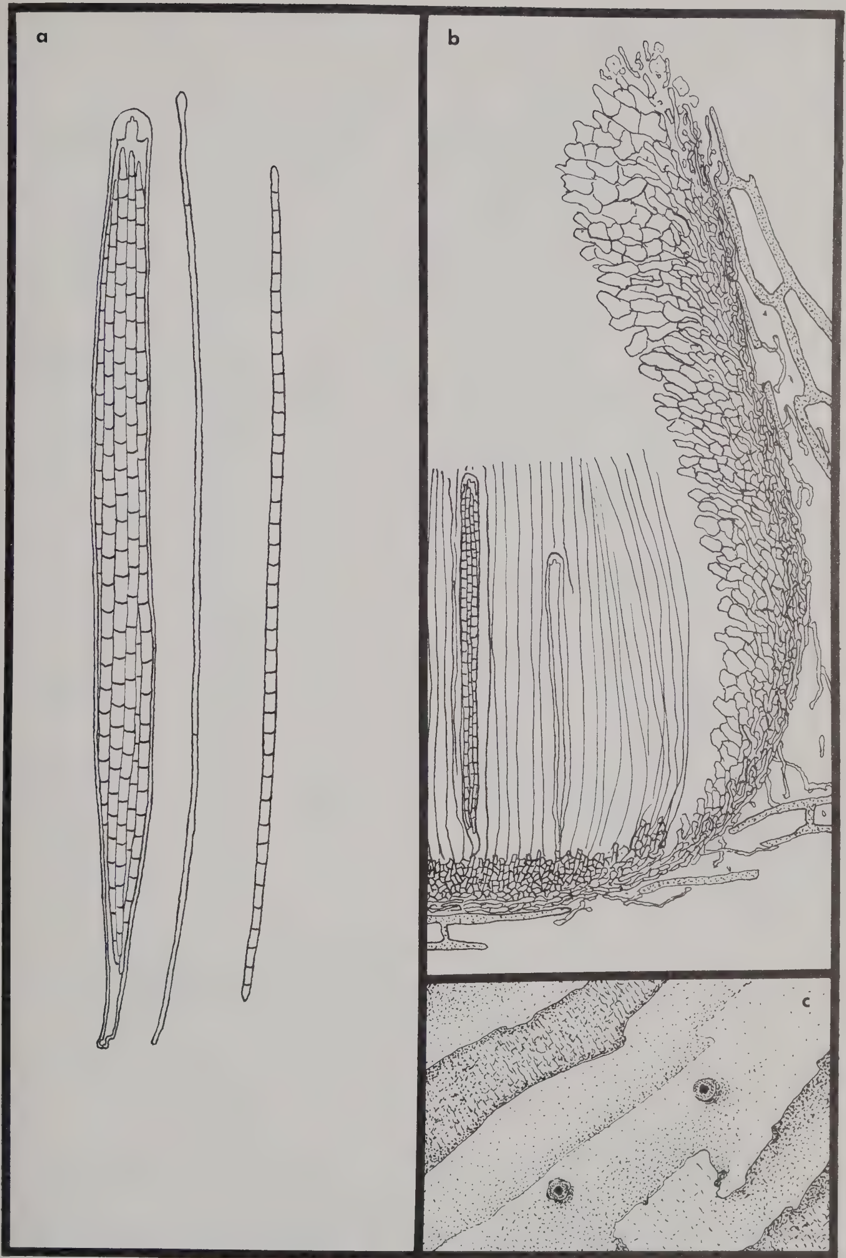

FIGURE 66. *Stictis elevata*. a. Ascus, paraphysis, and spores, x750. b. Cross section of margin, x300. c. Habit sketch, x7.5. Drawn from H-Karsten 1260.

urceolate. Margin, in cross section, 65 µm broad, containing little or no included host tissue, the wall 15 µm thick and composed of interwoven brown non-carbonized hyphae 1.5-2.0 µm diam., the inner layer of inward-pointing, large, pale brown cells 3-5 x 5-8 µm. A few crystals are present near the top of the margin, but these do not form a definite layer. Subhymenium brown, J-, of small angular cells. Hymenium J- throughout. Asci 150-180 x 7(-9) µm, the cap 5 µm thick, pierced by a broad pore. Paraphyses 1.0 µm thick below, enlarged to 1.5 µm at the apex, simple, colorless. Spores 8, 150 x 2.0 µm, septate, the cells 3-4 µm long.

On bark an herbaceous debris, Europe. Inconspicuous and probably uncommon.

SPECIMENS EXAMINED: EUROPE: Great Britain (K, on *Clematis*, Herfordshire, Plowright, holotype of *S. atro-alba*). Finland (H, Karsten, Fungi Fennici Exs. 932, on *Symphoricarpus*, isotype of *Stictis elevata*; Karsten 1259, on *Abies*, Kyrkslät, Wainio, lectoparatype [designated here] of *S. radiata* subsp. *minuscula*; Karsten 1260, on *Abies*, Wainio, 1882, lectotype [designated here] of *S. radiata* subsp. *minuscula*)

(74). (STICTIS EMARGINATA) Cooke & Massee, Grevillea 18: 7 (1889)
≡ *Propolis emarginata* (Cooke & Massee) Sherwood, Mycotaxon 5: 323 (1977)

For a discussion and redescription of this species, a member of the Phacidiales, see Sherwood (1977)

(75). (STICTIS EMERGENS) Karst., Fungi Fennici 756 (1868)
≡ *Merostictis emergens* (Karst.) Clements, Gen. Fungi 64 (1909)

Complete synonymy, and a redescription of the species, are given by Défago,(1967), who accepts the species in *Merostictis*.

(76). STICTIS EPRUINOSA Sherwood, spec. nov.

Figure 67

Ascocarpi primum immersi, profunde cupulati, 0.15-0.3 mm diam., margine integro, disco pallide ochraceo. Margo in sectione transversali 30 µm crassus, siccus ab hymenio se abrumpens, hypharum pariete 2.0 µm diam., achromo. Stratum crystallinum abest. Periphysoidea 15 x 2.0 µm, non ramosa. Paraphyses filiformes, simplices, 110-120 x 0.5 µm, achromae, in iodo non caerulescentes. Asci 110-120 x 5(-10) µm, apice 2.5-3.0 µm crassi, 8-spori. Sporae 110 x 3.0 µm, cellulis 2.5-4 µm longis.

HOLOTYPUS: CUP-MM-57, Las Mercedes, on unidentified decorticated twig, Tenerife, Canary Islands, R.P. Korf, W.C. Denison, L.M. Kohn & M.A. Sherwood, 4.I.1976

Apothecia deeply immersed in decorticated wood, 0.15-0.3 mm diam., the margin narrow, entire, visible on the surface of the substrate as a faint transluscent line between hymenium and wood, non-pruinose to obscurely pruinose, not raised above the level of the substrate. Hymenium pale

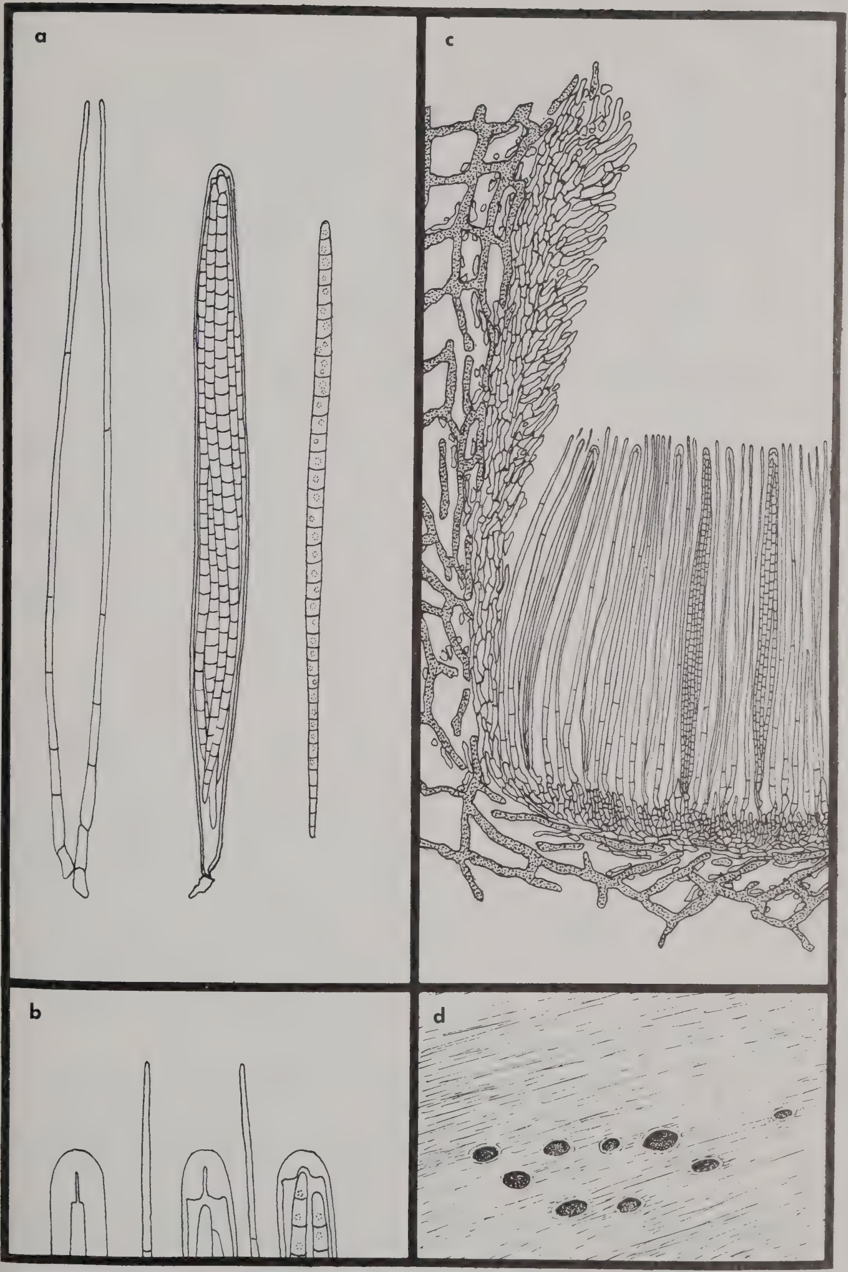

FIGURE 67. *Stictis epruinosa.* a. Ascus, paraphyses, and spores, x750. b. Detail of apices of asci, paraphyses, and spores, x1500. c. Cross section of margin, x375. d. Habit sketch, x15. Drawn from the holotype.

ochraceous, splitting away from the margin when dry. Margin in cross section 30 µm thick, with a wall of colorless interwoven hyphae 2.0 µm diam. and an inner layer of unbranched, non-gelatinous periphysoids 8-15 x 2.0 µm. Crystalline layer absent or nearly so. Paraphyses numerous, filiform, 2.0 µm broad below, tapering evenly to a 1.0 µm apex, unbranched, J- or very weakly J+. Asci 110-120 x 5(-10) µm, thick-walled when young, with an apical cap 2.5-3.0 µm thick, pierced by a broad, conical pore. Ascospores 8, 110 x 3.0 µm, not sheathed, tapering below, the cells 2.5-4 µm long.

On decorticated wood and herbaceous debris, Tenerife, Canary Islands. The specimens appear to be fully mature and do not seem to be a developmental form of either *S. stellata* or *S. radiata*, both of which occur in the same area. *S. epruinosa* is distinguished from *S. radiata* subsp. *intermedia*, which also has short spore cells, by its small size, poor crystal production, and uninflated paraphyses.

SPECIMENS EXAMINED (see also holotype, above): AFRICA: Canary Islands (CUP-MM 376, on *Ficus*, Tenerife; MM-386, on herbaceous stem, Tenerife)

(77). (STICTIS EXIGUA) Desm., Ann. Sci. Nat. Bot. sér. 3, 8: 183 (1847)
≡ *Merostictis exigua* (Desm.) Défago, Sydowia 21: 46 (1967)

A complete list of synonyms, and redescription of the species, are provided by Défago (1967).

(78). (STICTIS FAGICOLA) Phil.
= *Cryptodiscus foveolaris* (Rehm) Rehm, q.v.

(79). (STICTIS FARINOSA) Pers., Myc. Eur. 1: 339 (1822)
≡ *Propolis farinosa* (Pers.) Fr., Summa Veg. Scand. sect. post. 372 (1849)
≡ *Propolomyces farinosus* (Pers.) Sherwood, Mycotaxon 5: 321 (1977)

For a discussion of this species, see Sherwood (1977).

(80). (STICTIS FASCICULATA) (Pers.) Dietrich, Deutschlands Flora 35 (1848)
≡ *Solenia fasciculata* Pers., Myc. Eur. 1: 335 (1822)

The combination is incorrectly ascribed to Persoon by Dietrich (l.c.). It is probably a mistake rather than an intentional transfer.

(81). (STICTIS FENESTRATA) Roberge in Desm., Ann. Sci. Nat. Bot. sér. 3, 16: 321 (1851)
≡ *Hysterostegiella fenestrata* (Desm.) Höhn., Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Kl. Abt. 1, 126: 313 (1917)

Additional synonyms are provided by von Höhnel (l.c.) and Défago (1967), who provides a redescription of the species under *Hysterostegiella*.

(82). STICTIS FILICICOLA Seaver & Waterston

= *Stictis radiata* Pers., q.v.

(83). (STICTIS FILICINA) Niessl, Bot. Jahresber. (Just) 1: 284 (1874) non *S. filicina* Peck (1878)
≡ *Xylogramma filicina* (Niessl.) Rehm in Rabenh., Krypt.-Fl. ed. 2, 1(3): 171 (1888)

Rehm (1888) was unable to find asci or spores in the examples he examined; I could find none in a specimen from the Farlow Herbarium, and am uncertain whether the fruitbodies are apothecia or pycnidia.

SPECIMEN EXAMINED: EUROPE: Austria (FH, Rabenhorst, Fungi Europaei 1709, on *Pteridium,* isotype of *Stictis filicina* Niessl.)

(84). (STICTIS FILICINA) Peck., Annual Rep. New York State Mus. 29: 56 (1878), non *S. filicina* Niessl (1874)

The species is a *Karstenia*. Since the epithet *filicina* is illegitimate, and since I do not know whether the species has a legitimate name elsewhere in the literature, I consider it premature to provide a new name for it here.

SPECIMEN EXAMINED: NORTH AMERICA: USA (CUP-D-6288, on *Osmunda*, New York, isotype of *Stictis filicina* Peck)

(85). (STICTIS FIMBRIATA) Schw., Trans. Amer. Philos. Soc. n.s. 4: 179 (1832)
≡ *Lasiostictis fimbriata* (Schw.) Bäuml.

For a discussion of this species and a complete list of synonyms, see Sherwood (1974).

(86). (STICTIS FIMENTARIA) Streinz, Nomenclatur Fungorum 588 (1862)

Streinz ascribes the species to Fries, Elech. 2: 27 (1828), apparently referring to a paragraph in which Fries speaks deprecatingly of insect eggs on dung which were sent to him as a *Stictis*. The name may well come from a third source, but I have been unable to locate any.

(87). (STICTIS FOLIICOLA) Berkeley & Curtis, J. Linn. Soc. (Bot.) 10: 371 (1868)
= *Propolis quadrifida* (Lév.) Mont.

For a discussion of this species, see Sherwood (1977).

(88). (STICTIS FOVEOLARIS) Rehm
≡ *Cryptodiscus foveolaris* (Rehm) Rehm

(89) *STICTIS FRIABILIS* (Phil. & Plowright) Sacc. & Trav. in Sacc., Sylloge Fung. 20: 898 (1911)
≡ *Peziza (Dasyscypha) friabilis* Phil. & Plowr., Grevillea 4: 121 (1876)
≡ *Schizoxylon friabilis* (Phil. & Plowr.) Dennis, Kew Bull. 17: 345 (1963)
= *Stictis sulphurea* Rehm in Rabenh., Krypt.-Fl. ed 2, 1 (3): 177 (1888)
= *Belonidium albo-rubrum* Grelet, Amateur Champignons 8: 43 (1922)

Figure 68

Apothecia at first immersed, becoming erumpent and at length nearly superficial, 0.3-0.6 mm diam., the margin thick, yellow-pruinose, deeply fissured and involute, the disc deeply urceolate, distinctly reddish, splitting away from the margin when dry. Margin in cross section c. 75 µm thick, 2-layered, containing little or no included host tissue, the wall of colorless interwoven hyphae 2.0 µm diam., these forming a compact layer adjoining the periphysoids in the lower and inner portions of the margin, becoming more loosely interwoven in the upper and outer portions, abundantly crystalliferous on the exterior, the crystals small and uniform, yellowish. Periphysoidal layer pseudoparenchymatous, of more or less isodiametric cells 2.0 µm diam., the innermost row elongate, with free ends. Subhymenium 40 µm thick, colorless, of small angular cells. Paraphyses numerous, filiform, 1.0 µm diam., colorless, 1-2 times branched and propoloid apically, J-. Asci 100-120 x 7-8 (-9) µm, thick-walled when young, the cap 3.0 µm thick, pierced by a broad pore. Ascospores 8, 55-70 x 2.5-3.5 µm, attenuate-clavate, septate, the cells 3-5 µm long.

On wood, bark, and woody fungi, Europe, and at high elevations in South America, fairly common. As the synonymy above indicates, the species somewhat resembles a *Dasyscyphus* in the field. I have seen no North American collections of this distinctive species. The superficial habit, yellow, fleshy margin, and propoloid paraphyses will immediately distinguish *S. friabilis* from any other species of *Stictis*. I have not seen the type of *Belonidium albo-rubrum*, but have little doubt that it is the same species.

SPECIMENS EXAMINED: EUROPE: Great Britain (K, on *Rubus*, Isle of Hull, 30.VII.1968; on *Quercus*, Wales, holotype of *Stictis friabilis*). France (Herb. Korf, Candousseau 4301, on *Pinus*, Pyrenees)(S, herb. Rehm, 1869, probable holotype of *S. sulphurea*; on *Carpinus*, Rehm, Besançon). Switzerland (S, herb. Rehm, on *Prunus*, 10.XII.1893). Italy (S, on *Abies*, Carelonte, Bresadola). Locality uncertain (S, on *Polyporus*). SOUTH AMERICA: Colombia (NY-Co 4878, Dto. Boyacá, K.P. Dumont, S.E. Carpenter, M.A. Sherwood & L.A. Molina; Co-6312, Dto. Antioquia, K.P. Dumont, S. E. Carpenter & M.A. Sherwood; Co-6381, *ibid.*). Peru (Ny-Pe 301, Prov. Junín, K.P. Dumont, S.E. Carpenter, P. Buriticá & M.A. Sherwood)

(90). STICTIS FULVA Peck
= *Stictis rhodoleuca* Sommerf., q.v.

(91). (STICTIS FURFURELLA) Cesati in Rabenh., Bot. Zeitung (Berlin) 13: 284 (1855)

I could find no asci or spores in either of the two specimens I examined, and unable to characterize the species. Saccardo's (1889) synonymy with *Schizoxylon aeruginosum* Fckl. cannot be verified on the basis of the material I have seen. The species is questionably Stictidaceous.

SPECIMENS EXAMINED: EUROPE: Italy (FH-Höhnel 4653, Rabenhorst Herb. Myc. 1929, Vercelli, on *Spartinus*, isotype of *Stictis furfurella*). Austria (FH-Höhnel, Schwartzbach, Salzburg 1908)

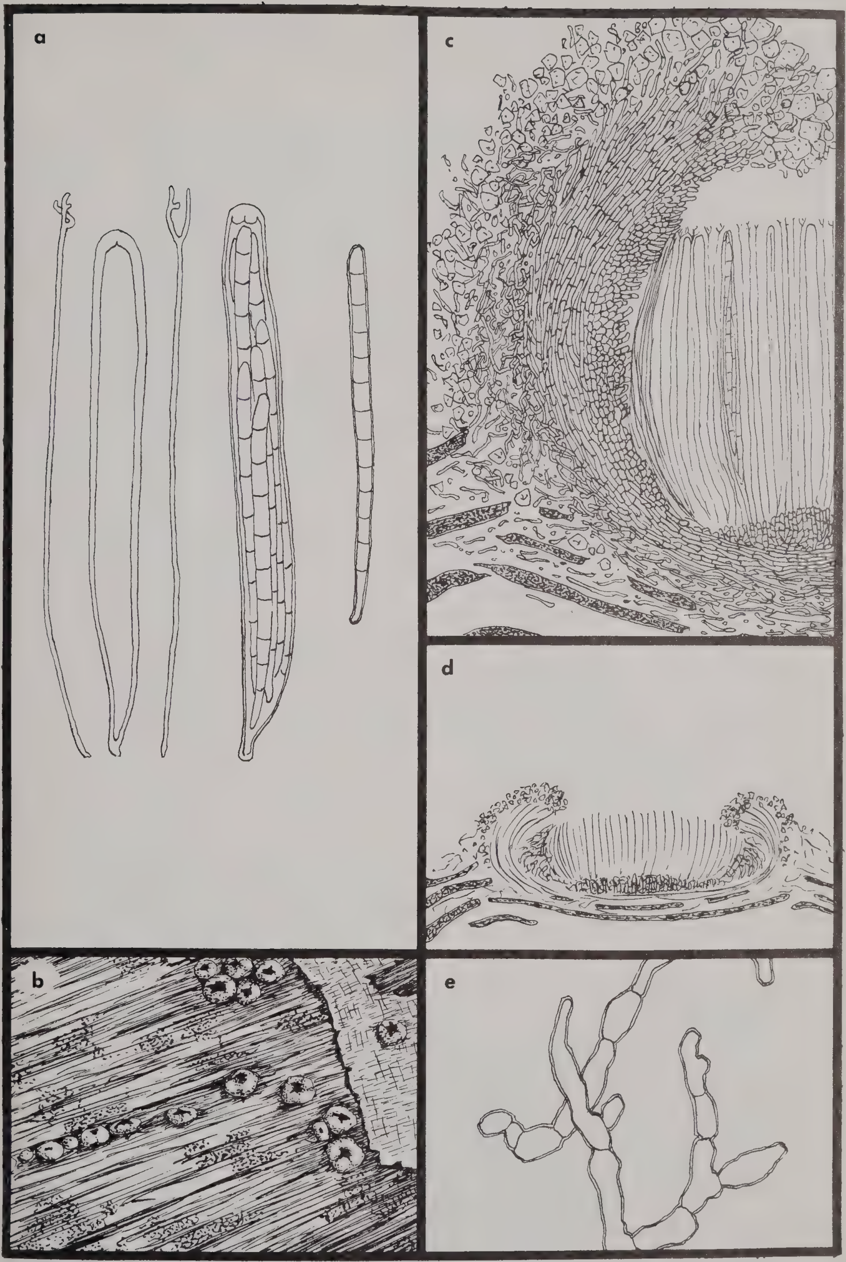

FIGURE 68. *Stictis friabilis.* a. Asci, paraphyses, and spores, x750. b. Habit sketch, x7.5. c. Cross section of margin, x375. d. Cross section of apothecium, x37.5. e. Marginal hyphae, x750. Drawn from the presumed holotype of *Stictis sulphurea.*

(92). STICTIS FUSCA Ellis & Bartholomew, Erythea 4: 3 (1896)

Figure 69

Apothecia immersed, opening by a pore, raising the substrate into pustules but not becoming erumpent, 0.5-0.75 mm diam., the margin entire, prominent, grey-pruinose, the disc moderately deeply urceolate, brown, grey-pruinose. Margin in cross section 80-100 µm thick, without a prominent accessory thalline margin, the outermost layer stromatic, carbonized, continuing beneath the hymenium, c. 50 µm thick, of large, closely-packed, more or less pseudoparenchymatous cells 5 x 2.5 µm, cystalliferous on the upper and outer faces. Crystalline layer indistinct. Periphysoids numerous, filiform, branched, 30 x 1.0 µm, colorless. Subhymenium colorless, of small angular cells resting on stromatic tissue. Paraphyses filiform, 1.0 µm broad, enlarged to 1.5-2.0 µm at the apex, colorless, simple or once-branched but not propoloid, faintly J+ blue. Asci 180-200 x 5-6 (-8) µm, thick-walled when young, the cap 3.0 µm thick, pierced by a broad pore. Ascospores 8, 175-190 x 1.5-2.0 µm, septate, the cells 3-5 µm long.

On dead twigs of *Symphoricarpus* and *Viburnum*, North America. The species is distinguished from *S. mollis* by the narrower spores, and by larger, carbonized cells in the margin.

SPECIMENS EXAMINED: NORTH AMERICA: USA (CUP-D-2040, Bartholomew, on *Symphoricarpus*, Kansas; D-2041, *ibid.*; D-7624, *ibid.*; isotype of *Stictis fusca*; D-9363, Ellis & Everhart, North American Fungi 3133, on *Symphoricarpus*, Kansas). Canada? (MAC, on *Viburnum*, Bisby 6.II.1926 [collection data, "LMAC", probably refers to Winnipeg campus])

(93). STICTIS FUSCELLA Sherwood, spec. nov.

Figure 70

Ascocarpi primum immersi, profunde cupulati, 0.1-0.3 mm diam., margine integro, brunneo, disco nigro. Margo in sectione transversali 70 µm crassus, siccus ab hymenio se abrumpens, hypharum pariete 1.5(-3-4) µm diam., brunneo. Stratum crystallinum 15-20 µm crassum. Periphysoidea 25 x 1.5 m, non ramosa. Paraphyses filiformes, non ramosae, 220 x 1.0 µm, apice ad 1.5-2.0 µm incrassatae, in iodo non caerulescentes. Asci 200-220 x 3.5 µm, apice 3.0 µm crassi, 8-spori. Sporae 200 x 1.0-1.2 µm, cellulis 8-10 µm longis. HOLOTYPUS: NY-Pe 28, on herbaceous stem, along the San Ramon-La Oroya rd. ca. 60 km from intersection of La-Oroya Tingo Maria rd., Dpto Junín. Elev. 2500 m. Dumont, Carpenter, Sherwood, Buriticá, Guzmán, Reynolds, 26 June 1976.

Apothecia at first immersed, opening by a pore, not becoming erumpent, 0.1-0.3 mm diam., the margin entire, dark brown, grey-pruinose, the disc deeply immersed, dark brown to black, splitting away from the margin when dry. Margin in cross section 70 µm thick, 3-layered, the wall 30 µm thick, of interwoven brown hyphae 1.5 µm diam., not carbonized, the hyphae irregularly inflated to 3-4 µm near the summit of the margin. Crystalline layer well-developed. Periphysoids colorless, simple to sparingly branched, 25 x

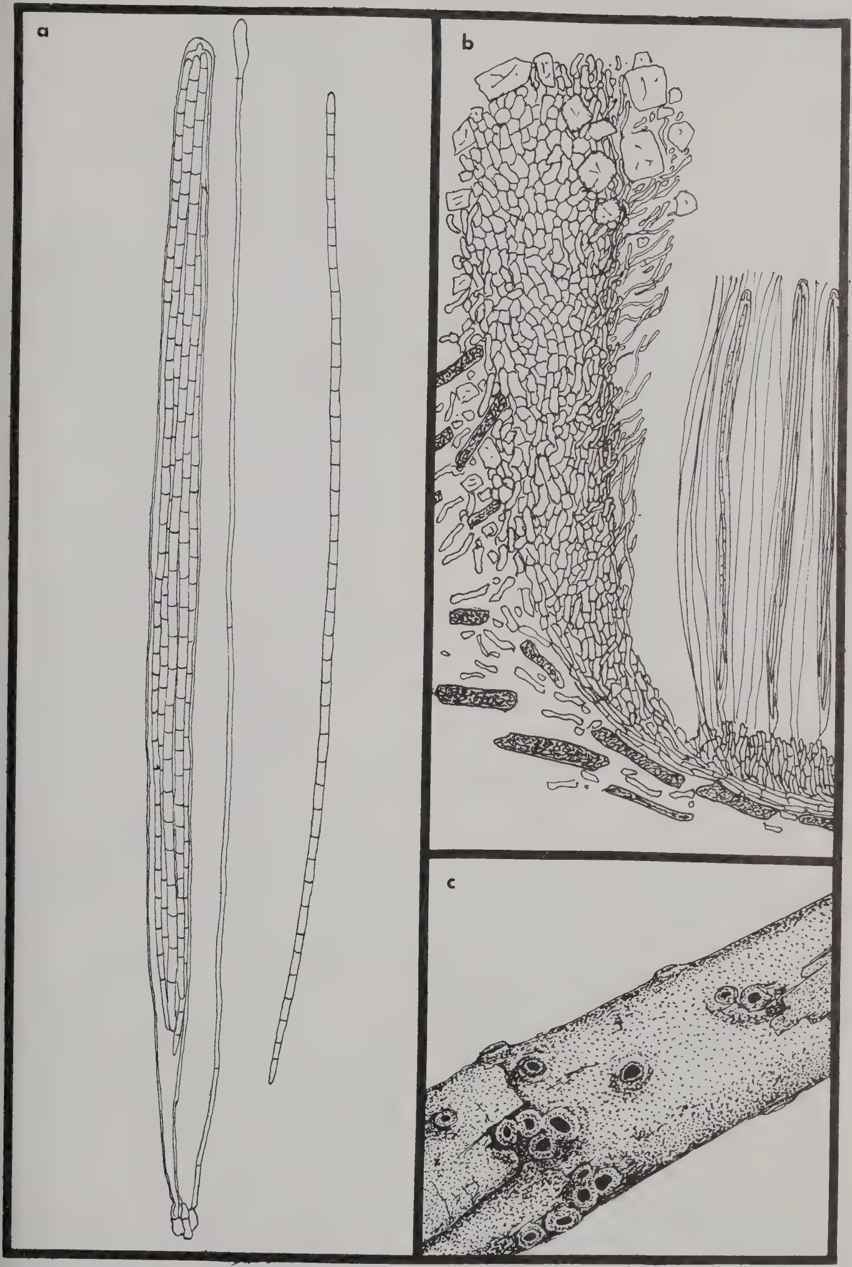

FIGURE 69. *Stictis fusca.* a. Ascus, paraphysis, and spores, x750. b. Cross section of margin, x300. c. Habit sketch, x7.5. Drawn from Ellis & Everhart, North American Fungi 3133 (CUP-D)

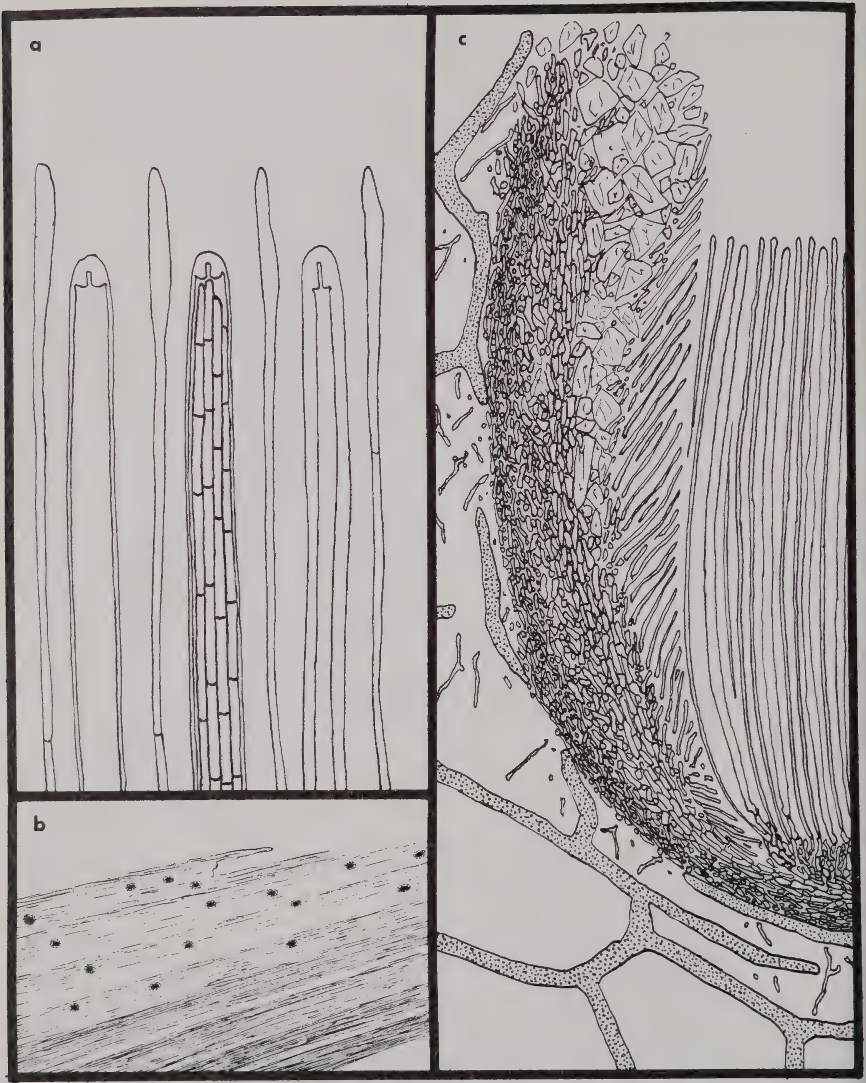

FIGURE 70. *Stictis fuscella*. a. Detail of apices of asci, paraphyses, and spores, x1500. b. Habit sketch, x7.5. c. Cross section of margin, x375. Drawn from the holotype.

1.5 µm, Subhymenium colorless, of small angular cells 2.0 µm diam., J-, lying on 10 µm of dark brown wall hyphae 1.5 µm diam. Paraphyses simple, colorless, J-, 1.0 µm diam. below, enlarged to 1.5-2.0 µm apically. Asci 200-220 x 3.5 µm, the cap 3 µm thick, pierced by a narrow pore. Ascospores 8, 200 x 1.0-1.2 µm, the cells 8-10 µm long.

On an "herbaceous stem" (probably a grass), Peru.

Stictis polycocca and *S. pustulata* lack a well-defined crystalline layer and are erumpent. *S. fusca* has a larger-celled excipulum, shorter asci, and branched periphysoids.

SPECIMEN EXAMINED: See holotype, above.

(94). STICTIS GIGANTEA Sherwood, spec. nov.

Figure 71

Ascocarpi primum immersi, erumpescentes, profunde cupulati, 1.2-2.0 mm diam., margine integro, nigro, disco brunneo. Margo in sectione transversali 200 µm crassus, siccus ab hymenio se abrumpens, hypharum pariete 2.0 µm diam., brunneo. Stratum crystallinum abest. Periphysoidea 50-75 x 1.5 µm, non ramosa vel ramosa. Paraphyses filiformes, simplices vel ramosae, 350 x 1.0 µm, achromae, in iodo non caerulescentes. Asci 300-350 x 5(-6) µm, apice 5-6 µm crassi, 8-spori. Sporae 300-325 x 1.5 µm, cellulis 4-5 µm longis.

HOLOTYPUS: K, on *Costus afer*, Kyuianga Forest, Uganda, Maitland 500.

Etymology: This species has some of the largest apothecia known in *Stictis*.

Apothecia gregarious, at first immersed, raising the substrate into prominent pustules, at length becoming nearly superficial following scaling away of the substrate. Margin dark grey, entire, not pruinose, minutely whitish-tomentose; disc deeply urceolate, brown, splitting away from the margin when dry. Margin in cross section 200 µm thick, without a prominent accessory thalline margin, composed of dark brown, non-carbonized interwoven hyphae 2.0 µm broad, not markedly gelatinous. Periphysoids sparse, matted, 50-75 x 1.5 µm, occasionally branched. Crystalline layer nearly obsolete, consisting of a few large crystals imbedded among the periphysoids in the upper part of the margin. Subhymenium 60 µm thick, of small, colorless, angular cells, resting on 40 µm of dark wall tissue. Paraphyses numerous, filiform, J-, 1.0 µm broad, not enlarged apically, occasionally branched but not propoloid. Ascospores 8, 300-325 x 1.5 µm, the cells 4-5 µm long.

On *Costus* and unidentified herbs, East Africa. This is the only large black *Stictis* with a tomentose margin.

SPECIMENS EXAMINED (see also holotype, above): AFRICA: Rwanda (LG, Lambignon 74/602, Rutsiro)

(95). (STICTIS GILVA) Fr., Sclerom. Sueciae 436 (1834), nom. nud.

≡ *Propolis gilva* (Fr.) de Not., Comment. Crittog. Ital. 5: 364 (1863)

The species is also cited by Fries (1849) and Saccardo (1889), but none of these authors provide a description of *S. gilva*. I have been unable to borrow a specimen of Scleromycetes Sueciae 436. In any case, the name does not seem to have been validly published.

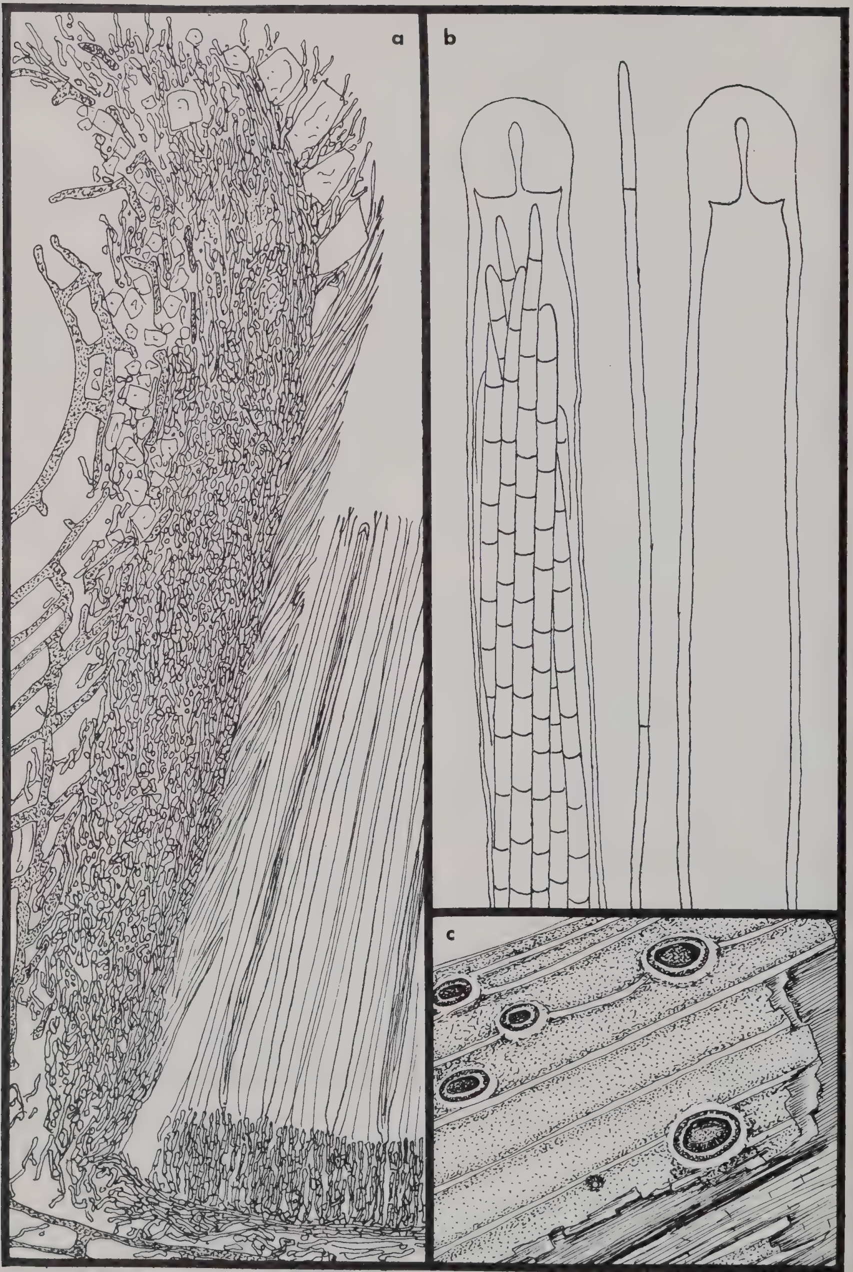

FIGURE 71. *Stictis gigantea.* a. Cross section of margin, x225. B. Detail of apices of asci, paraphysis, and spores, x1500. c. Habit sketch, x 7.5. Drawn from the holotype.

(96). (STICTIS GLAUCOMA) Berk. & Curt.
= *Schizoxylon ligustri* (Schw.) Sherwood, q.v.

(97). STICTIS GRAMINICOLA Lasch in Rabenh., Herb. Myc. ed. 2, 713 (1858)
= *Schmitzomia luzulae* (Lib.) de Not. subsp. *junci* Karst., Fungi Fennici 931 (1870)
≡ *Stictis junci* (Karst.) Velenovský, Monogr. Discom. Bohem. 1: 54 (1934)

Figure 72

Apothecia at first immersed, opening by a pore but not becoming erumpent, 0.3-0.5 mm diam., the margin white, inconspicuous, entire, the disc deeply urceolate, pale ochraceous. Margin in cross section c. 50 µm thick, colorless, pseudoparenchymatous, lacking an accessory thalline margin or crystalline layer, the wall of slender interwoven colorless hyphae 1.0-1.5 m diam., the periphysoidal layer composed of isodiametric, 2.0-2.5 µm diam. cells, hyphal only on the inner face. Subhymenium c. 10 µm thick, of small, angular, isodiametric cells, J-. Paraphyses numerous, filiform, 1.0 m thick, not enlarged above, sometimes once-branched but not propoloid, J-. Asci 130 x 5(-5.5) µm, the cap 1.0 µm thick, not distinct. Ascospores 8, 100 x .75-1.0 µm, septate, the cells 5-8 µm long.

On grasses and grasslike monocots, Europe. Apparently rare. A pseudoparenchymatous margin distinguishes this species from *S. pusilla*; smaller size and narrower spores will separate it from graminicolous specimens of *S. stellata*. Very long-cylindrical asci and a hymenium which splits away from the margin when dry distinguish this species from immersed Dermateaceae (e.g. *Hysteropezizella*) on similar substrates.

SPECIMENS EXAMINED: EUROPE: Germany (FH, Rabenhorst Herb. Myc. ed. 2, 713, on *Deschampsia*, isotype of *Stictis graminicola*). Norway? (O, Sommerfelt, on *Acorus*, sine loc.). Finland (H, Karsten, Fungi Fennici Exs. 931, on *Juncus*, isotype of *Schmitzomia luzulae * junci*)

(98). STICTIS GRAMINUM Desm.
= *Stictis arundinacea* Pers., q.v.

(99). (STICTIS GRAPHIDEA) Pers. in Gaudichaud, Voyage d l' Uranie 178 (1826)

No material remains in Persoon's herbarium. The species was described as having linear, flexuous fruitbodies, opening by a slit, with a white-pruinose margin, growing on bark in Rawak. The description would fit *Graphis afzelii* Ach., and probably pertains to a similar species.

(100). STICTIS HAWAIIENSIS Cash, Mycologia 30: 98 (1938)

Figure 73

Apothecia immersed, not becoming erumpent, 0.3-0.6 mm diam., the margin moderately thick, entire to lacerate, white-pruinose, the disc deeply urceolate, pale ochraceous,

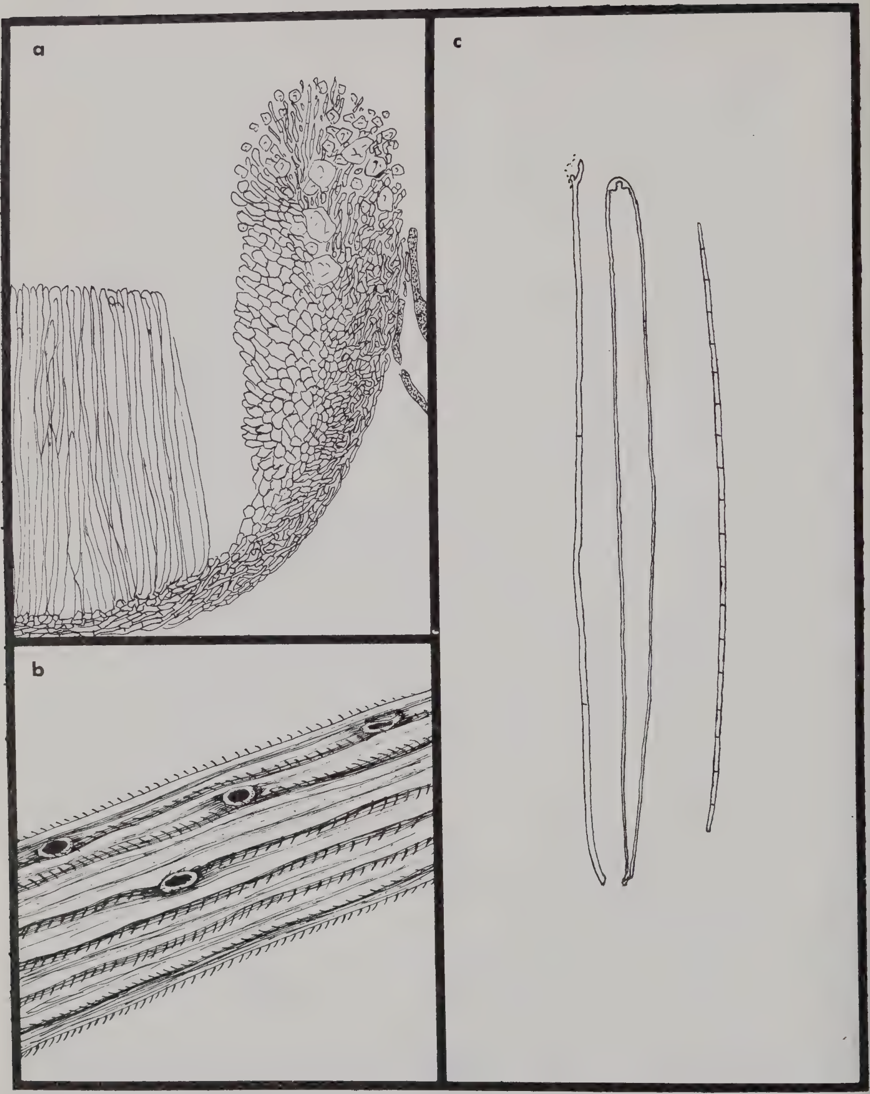

FIGURE 72. *Stictis graminicola*. a. Cross section of margin, x300. b. Habit sketch, x7.5. c. Ascus, paraphysis, and spore, x750. Drawn from FH-Rabenh., Herb. Myc. ed. 2, 931.

splitting away from the margin when dry. Margin in cross section variable in thickeness, 50-100 μm thick, without a prominent accessory thalline margin, colorless, the wall composed of slender, interwoven hyphae 1.5 μm diam., the periphysoids unbranched to sparingly-branched, 15-20 x 1.5 μm, forming a compact layer. Subhymenium 20 μm thick, of small, colorless, isodiametric cells, J-. Paraphyses numer-

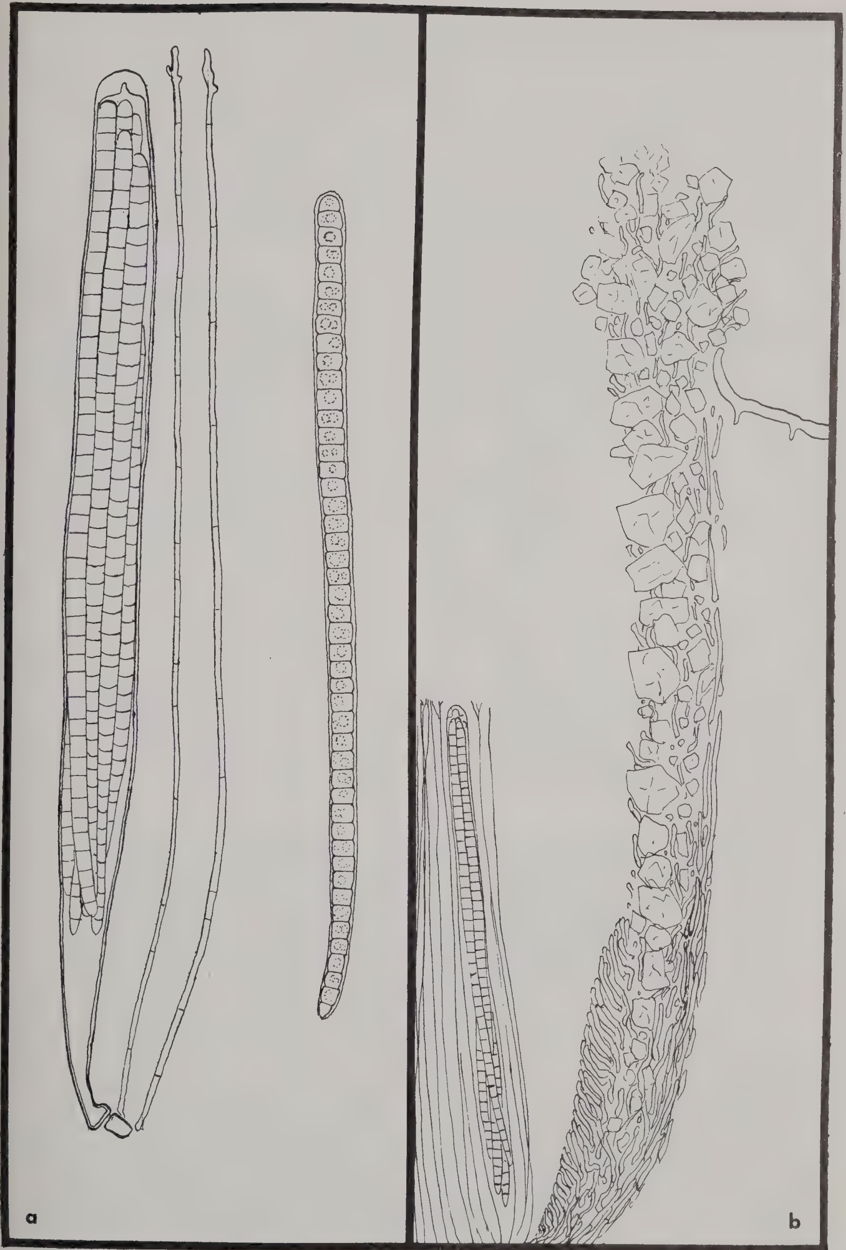

FIGURE 73. *Stictis hawaiiensis*. a. Ascus, paraphyses, and spores, x750. b. Cross section of margin, x375. Drawn from the holotype.

ous, filiform, 1.0 µm thick, enlarged to 1.5 µm above, sometimes branched, not propoloid, faintly J+ blue. Asci 175-250 x 12 (-15) µm, thick-walled when young, the cap 4-6 µm thick, pierced by a broad pore. Spores 8, 150-200 x 3.5-4.5 µm, obscurely sheathed, septate, the cells 2.5-3.5 µm long, not coiling when freed from the ascus.

On twigs and herbaceous stems, throughout the humid tropics. Fairly common. The species differs from *Stictis stellata* and *S. radiata* subsp. *intermedia* only in having longer, broader asci and ascospores.

SPECIMENS EXAMINED: OCEANIA: Hawaii (BPI, on *Rubus*, Degener 3776, holotype of *Stictis hawaiiensis*). ASIA: Philippines (CUP-Sa 1413, Luzon, K.P. Dumont). Ceylon (CUP-Sa 3244b, Central Province, Dumont & Peter; Sa-3238, *ibid.*). South America: Ecuador (NY-Ec 448, Prov. Pichincha, Dumont, Carpenter & Buriticá, 18.VII.1975). Colombia (NY-Co 1725, Dto. Antioquia, Dumont et al., 20.VII.1974; Co-6446, Dumont et al., Dto. Antioquia; Co-7232, Dumont et al.). Peru (Ny-Pe 66, Prov. Junín, Dumont et al.; Pe-448, Dumont et al.). Venezuela (NY-Ve 4025, Edo. Sucre, Dumont et al.; 6.VII.1972; Ve-5345, Edo Monagas, Dumont et al., 18.VII. 1972; Ve-259a, Edo. Miranda, Dumont et al., 19.VI.1971; Ve-2025, Edo. Aragua, Dumont et al., 12.VII.1971; Ve-6082, Edo. Monagas, Dumont et al, 18.VII.1972). Argentina (K, Prov. Salta, Singer T-1441)

(102). (STICTIS HEDERAE) Crouan & Crouan, Fl. Finist. 41 (1867)
≡ *Propolis hederae* (Crouan & Crouan) Sacc., Sylloge Fung. 8: 652 (1889)

It is probable that this species, with a white disc 2-3 mm broad and unicellular fusoid spores, is a species of *Propolomyces*. I was unable to borrow the type specimen.

(103). STICTIS HELICOSPORA Sherwood, spec. nov.

Figure 74

Ascocarpi primum immersi, profunde cupulati, 0.05-0.1 mm diam., margine integro vel lacerato, albo, disco pallide ochraceo. Margo in sectione transversali 25 µm crassus, siccus ab hymenio se abrumpens, hypharum pariete 1.5 µm diam., achromo. Stratum crystallinum 10 µm crassum. Periphysoidea 10 x 1.5 µm, non ramosa. Paraphyses filiformes, non ramosae, 90 x 1.0 µm, achromae, in iodo non caerulescentes. Asci 80-90 x 3.5-4 µm, apice 2.5 µm crassi, 8-spori. Sporae 35-50 x 1.5 µm, vagina gelatinosa involutae, cellulis 11-15 µm longis.

HOLOTYPUS: COL [Dumont] 4203, km post 16-17 from Mosquera on Mosquera-La Mesa rd., Dpto. Cundinamarca. Elev. c. 9300'. Dumont, Carpenter, Sherwood, 5 June 1976. ISOTYPUS: NY

Ascocarps at first immersed, opening by a pore, raising the substrate into obscure pustules but not becoming erumpent, 0.05-0.1 mm diam., barely visible on the surface of the substrate as minute white-rimmed pores, the margin entire to lacerate, narrow, the disc deeply-immersed, pale ochraceous. Margin in cross section c. 25 µm thick, consisting of a wall of 2-4 layers of interwoven colorless hyphae 1.5 µm diam., lined on the inside with unbranched

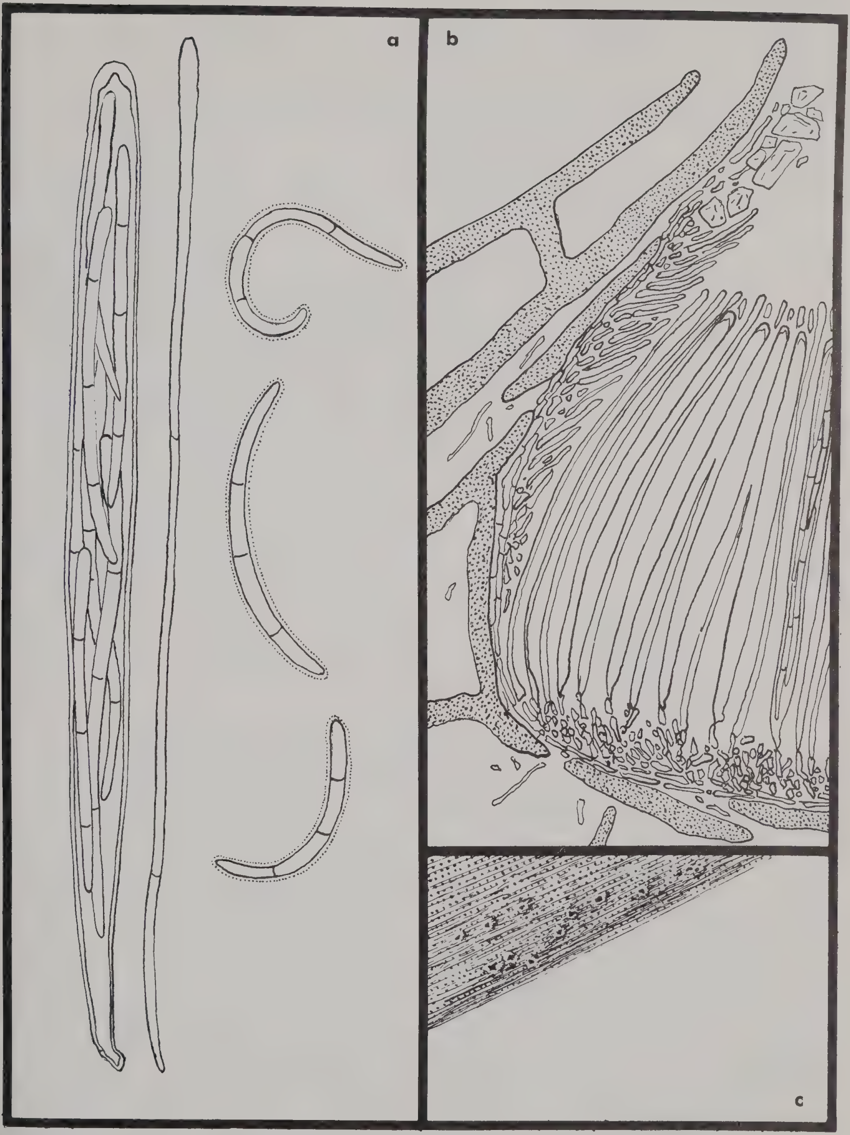

FIGURE 74. *Stictis helicospora*. a. Ascus, paraphysis, and spores, x1500. b. Cross section of margin, x750. c. Habit sketch, x7.5. Drawn from NY-Co 4203.

periphysoids 10 x 1.5 μm. Crystalline layer poorly-developed, 10 μm thick. Paraphyses filiform, 1.0 μm broad below, enlarged to 1.5 m at the apex, simple, J-, colorless. Asci 80-90 x 3.5-4 μm, the apex 2.5 μm thick, pierced by a broad pore. Ascospores 8, irregularly 4-seriate, 35-50 x 1.5 μm, 3-septate, sheathed, coiling when freed from the ascus.

On leaves of tank Bromeliads at high elevations, Colombia.

SPECIMENS SEEN (see also holotype, above): SOUTH AMERICA: Colombia (NY-Co 4400, Dpto. Cundinamarca, Dumont, Carpenter, Sherwood, Molina, 9.VI.1976)

(104). STICTIS HELICOTRICHA Ell. & Everh.
= *Stictis pustulata* Ell. & Everh.

(105). (STICTIS HEMISPHAERICA) Fr., Syst. Mycol. 2(1): 196 (1822)
≡ *Odontotrema hemisphaerica* (Fr.) Rehm in Rabenh., Krypt.-Fl. ed. 2, 1(3): 205 (1888)
≡ *Xylopezia hemisphaerica* (Fr.) Höhn., Ann. Mycol. 15: 308 (1917)

The species, which is a Loculoascomycete with bitunicate asci, is discussed briefly under *Xylopezia*, above.

(106). (STICTIS HIPPOCASTANI) Pers., Myc. Eur. 1: 336 (1822)
= *Propolomyces farinosus* (Pers.) Sherwood

The species was synonymized with *Hysterium fagineum* Schrad. by Streinz (1862). The protologue suggests that it is a *Propolomyces* rather than a *Stictis*. I have seen no original material of *S. hippocastani*. See Sherwood (1977).

(107). STICTIS HYDRANGEAE Schw., Trans. Amer. Philos. Soc. n.s. 4: 179 (1832)

Figure 75

Apothecia scattered, at first immersed, then partially erumpent, opening by a pore 0.7-1.0 mm diam., the margin thick, white-pruinose, usually splitting into lobes, the disc moderately deeply urceolate, pinkish, splitting away from the margin at maturity. Margin in cross section 3-layered, lacking a stroma or thalline margin, the wall up to 100 μm thick, of interwoven colorless hyphae 1.0-1.5 μm diam., surrounded by a gelatinous matrix; crystalline layer prominent, 50 μm thick, of large, colorless crystals. Periphysoids 40 x 1.5 μm, septate, sometimes branched, forming a compact layer imbedded in a gelatinous matrix, J-. Paraphyses 1.0 μm broad, branched and elegantly circinate at the apex, not enlarged, J-. Asci 275-300 x 5-6 μm, the cap 5.0 μm thick, pierced by a narrow pore. Ascospores 8, 250-300 x 1.5-1.75 μm, the cells 8-10 μm long.

On dead twigs, Europe and North America. This conspicuous species is apparently quite rare. *S. ramuligera*, a similar tropical species, differs in having a non-gelatinous margin and short, unbranched periphysoids.

SPECIMENS EXAMINED: NORTH AMERICA: USA (CUP-D-3902, sine coll., part of type of *S. hydrangeae* ex PH; 50884, on *Hydrangea*, Indiana, Rogerson; D-12248, on *Hydrangea*, North Carolina). Canada (NY, Ontario, Dearness 7/9/1889). EUROPE: Italy? (ZT, Arcegnoe, Raschle, 20.VII.1974)

(108). (STICTIS HYPODERMIA) Bres.

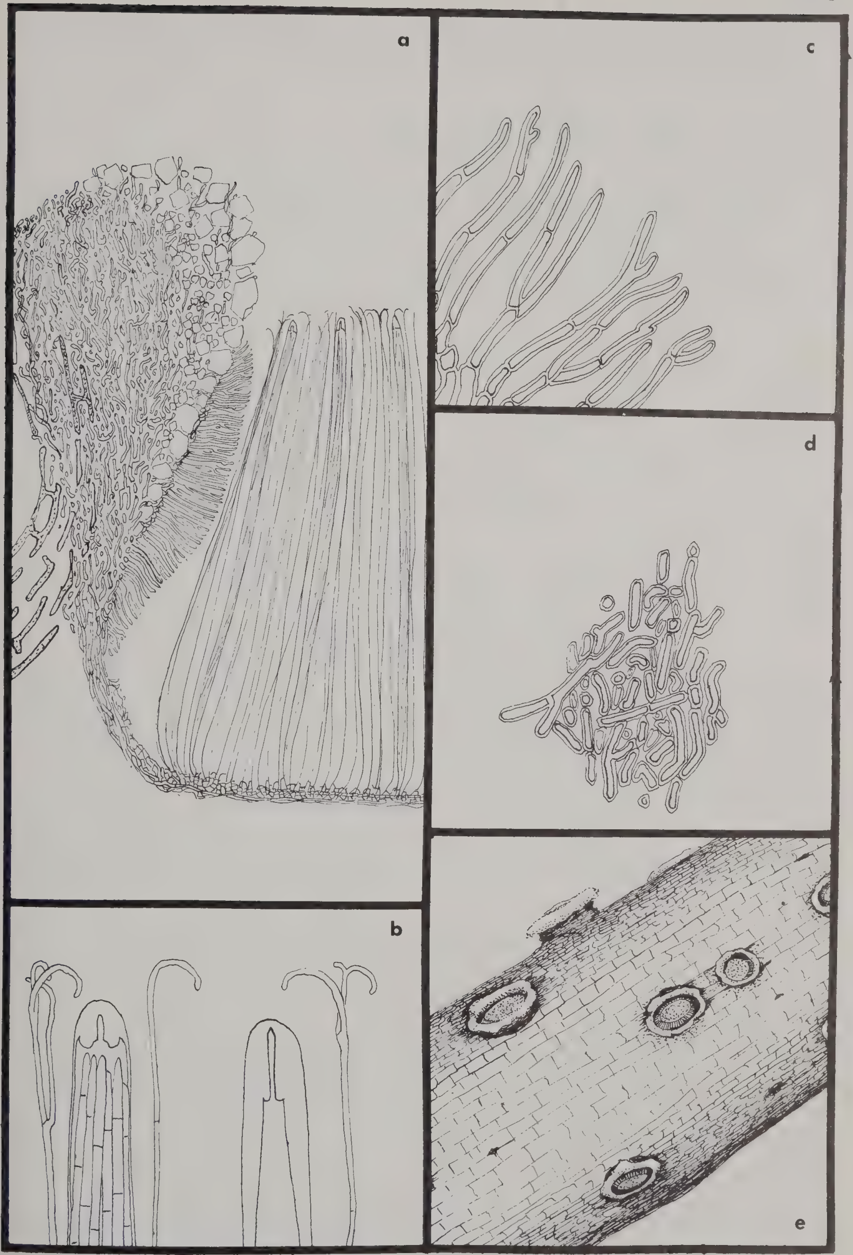

FIGURE 75. *Stictis hydrangeae.* a. Cross section of margin, x225. b. Detail of apices of asci, paraphyses, and spores, x1500. c. Periphysoids, x750. d. Wall hyphae, x750. e. Habit sketch, x7.5. Drawn from CUP-D 50884.

= *Schizoxylon albo-atrum* Rehm, q.v.

(109). STICTIS HYSSOPI Schw.
= *Stictis radiata* Pers., q.v.

(110). (STICTIS HYSTERINA) Fr., Syst. Mycol. 2(1): 199 (1822)
≡ *Melittosporium hysterinum* (Fr.) Gillet, Discom. 187 (1886)
≡ *Xylogramma hysterinum* (Fr.) Rehm in Rabenh., Krypt.-Fl. 2, 1(3): 171 (1888)
= *Hysterium stictoideum* Cke. & Ell., Grevillea 7: 7 (1878)

A note with Ellis and Everhart's North American Fungi 1281a says "Dr. Th. M. Fries has compared this spec. to *S. hysterina* in his father's herbarium and considers it to be that species." This is a typical *Melittosporium* with brown muriform spores and bitunicate asci. Additional synonyms are given by Rehm (1887-96).

Specimen examined: NORTH AMERICA: USA (OSC, Ellis & Everhart, North American Fungi 1281a)

(111). (STICTIS HYSTERIOIDES) Desm., Ann. Sci. Nat. Bot. sér. 2, 19: 365 (1843)
≡ *Propolis hysterioides* (Desm,) Fckl., Jahrb. Nassauischen Vereins Naturk. 23-24: 255 (1870)
≡ *Naemacyclus hysterioides* (Desm.) Fckl., Jahrb. Nassauischen Vereins Naturk. 27-28: 50 (1873)
≡ *Phragmonaevia hysterioides* (Desm.) Rehm in Rabenh., Krypt.-Fl. 2, 1(3): 162 (1888)
≡ *Hysteropezizella hysterioides* (Desm.) Nannf., Nova Acta Regiae Soc. Sci. Upsal. ser. 4, 8: 118 (1932)

Rehm's Ascomyceten 1954, which Nannfeldt examined, is indeed a *Hysteropezizella*, or closely allied. I have seen no type material of this species, but it is unlikely that it is Ostropalean.

SPECIMEN EXAMINED: EUROPE: (CUP-D-12025, Rehm, Ascomyceten 1954)

(112). (STICTIS ILLICINA) Grelet & de Crozals, Bull. Soc. Mycol. France 44: 337 (1928)

I have been unable to locate the type specimen. According to the original description the asci were conic-attenuate, measured 90-110 x 9-10 µm, and contained long-cylindrical spores. This species may be a member of the Phacidiales, such as *Colpoma*.

(113). (STICTIS INCLUSA) (Pers.) Fr., Summa Veg. Scand. sect. post. 373 (1849)
≡ *Peziza inclusa* Pers., Myc. Eur. 1: 307 (1822)
≡ *Patellaria inclusa* (Pers.) Karst., Bidrag. Kännedom Finlands Natur Folk 19: 236 (1871)
≡ *Odontotrema inclusa* (Pers.) Karst., Acta Soc. Fauna Fl. Fenn. 2(6): 146 (1885)

On wood. From the published descriptions, this is probably a species of *Xylogramma*. I have seen no original material.

(114). STICTIS INCARNATA (Quélet) Sacc., Sylloge Fung. 8: 684 (1889)
≡ *Schmitzomia incarnata* Quél., Compt. Rend. Assoc. Franc. Avancem. Sci. (La Rochelle, 1882) 11: 408 (1883)

I have been unable to locate a specimen of *S. incarnata*. The original description suggests that it is indeed a *Stictis*, but will not serve to characterize it further. It may be a form of *S. radiata*.

(115). (STICTIS INDICA) Tilak & Nanir
= *Schizoxylon lantanae* (Tilak & Nanir) Sherwood, q.v.

(116). STICTIS INSCULPTA Wallr., Fl. Crypt. Germ. 2: 442 (1833)

No material of this species remains in Wallroth's herbarium (STR). The original description will not serve to characterize it.

(112). SCHMITZOMIA INSIGNIS de Not., Comment. Soc. Crittog. Ital. 2: 316 (1867)
≡ *Schizoxylon insigne* (de Not.) Rehm in Rabenh., Krypt.-Fl. 2, 1(3): 1253 (1896)

I was unable to obtain type material from Rome. The specimen in Saccardo's herbarium is authentic and agrees with the original description; it is, however, overmature, and will not serve to characterize the species. It consists of orbicular fruitbodies with a margin of dark brown hyphae and crystalline material, without periphysoids. The hymenium is J- and lacks asci and spores. This may be *Stictis mollis* or *Schizoxylon albo-atrum*.

SPECIMEN EXAMINED: EUROPE: Italy (PAD, Erbar. Crittogam. Ital. ser. 2, 587, on *Salix*, Carestia)

(118). STICTIS INTERMEDIA Speg.
≡ *Stictis radiata* Pers. subsp. *intermedia* (Speg.) Sacc., q.v.

(119). (STICTIS JANGAE) "Farlow" in Gola, Atti Acad. Sci. Veneto Trent. Istriana 21: suppl. 1, 139 (1930), lapsus calami for *S. tsugae* Farlow, q.v.

(120). STICTIS JAVANICA Sherwood, spec. nov.

Figure 76

Ascocarpi primum immersi, profunde cupulati, 0.2-0.4 mm diam., margine integro, albo, disco pallide ochraceo. Margo in sectione transversali 50 µm crassus, siccus ab hymenio se abrumpens, hypharum pariete 1.5 µm diam., achromo. Stratum crystallinum 25-30 µm crassum. Periphysoidea 10 x 1.5 µm, non ramosa. Paraphyses filiformes, ramosae, 65-70 x 1.0 µm, in iodo non caerulescentes. Asci 60-65 x 10 µm, apice 5.0 µm crassi, 8-spori. Sporae 42-50 x 2.5 (-3) µm, cellulis 6-7 µm longis.

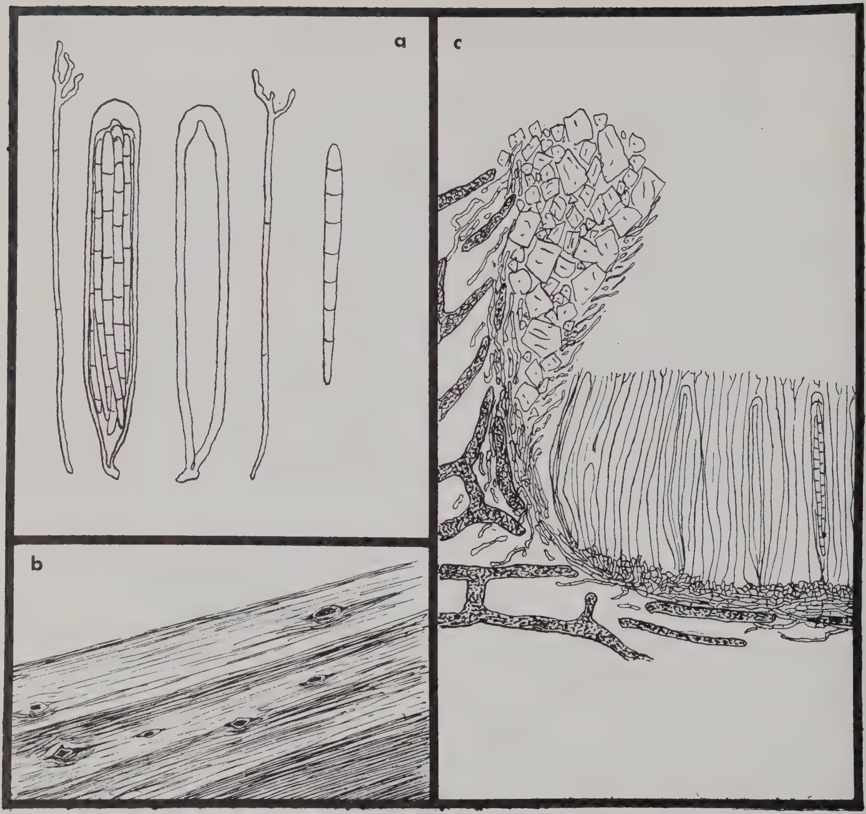

FIGURE 76. *Stictis javanica.* a. Asci, paraphyses, and spores, x750. b. Habit sketch, x7.5. c. Cross section of margin, x375. Drawn from the holotype.

HOLOTYPUS: CUP-Sa 415, on decaying stem of cultivated sedge, Tijbodas, Java, M. Rifai & R.P. Korf, 25.XII.1961.

Apothecia at first immersed, opening by a pore, not erumpent, 0.2-0.4 mm diam., elliptical in outline, the margin thin, entire, white-pruinose, the disc deeply-urceolate, pale ochraceous. Margin in cross section 50 µm thick, the wall colorless, nearly obsolete, the crystalline layer prominent, of moderately large, non-uniform crystals, the periphysoids unbranched, colorless, 10 x 1.5 µm. Hymenium J- throughout. Paraphyses numerous, filiform, 1.0 µm diam., branched and propoloid at the apex. Asci 60-65 x 10 µm, very thick-walled when young, the cap 5 µm thick, pierced by a broad pore. Spores 42-50 x 2.5-3 µm, tapering below, 7-septate.

On a sedge, Java. *S. dumontii* is similar, but has 4-spored asci and larger, more closely-septate spores.

SPECIMEN EXAMINED: See holotype, above.

(121). STICTIS JUNCI (Karst.) Velenovský
= *Stictis elevata* (Karst.) Karst., q.v.

(122). STICTIS KAMATII Tilak & Kale, Maharashtra Vidnyan Patrika 5(1-2): 4-8 (1970)

Cited in a key by Tilak & Nanir (1975). The journal is apparently unavailable and I have received no answer to requests for reprints and specimens from the above authors. Not cited in Index of Fungi.

(123). STICTIS KORFII Sherwood, spec. nov.

Figure 77

Ascocarpi primum immersi, profunde cupulati, 0.7-1.0 mm diam., margine integro, griseo, disco brunneo. Margo in sectione transversali 130 μm crassus, siccus ab hymenio se abrumpens, hypharum pariete 1.5 μm diam., brunneo. Stratum crystallinum 80 μm crassum. Periphysoidea 100 x 1.5 μm, ramosa. Paraphyses filiformes, simplices, 200 x 1.0 μm, brunneae, in iodo non caerulescentes. Asci 190-205 x 7-8 (-9) μm, apice 5.0 m crassi, 8-spori. Sporae 180 x 1.0-1.5 μm, cellulis 5-7 μm longis.

HOLOTYPUS: MPU-Maire 5104, in ramis emortuis *Anagyridis foetidae*, Algeria, 25.XI.1917.

Apothecia at first immersed, opening by a pore, not erumpent, 0.7-1.0 mm broad, the margin pale grey, entire, prominent, the disc deeply urceolate, brown, splitting away from the margin when dry. Margin in cross section 130 μm thick, without a prominent accessory thalline margin, the wall 40 μm thick at its broadest point, of brown, non-carbonized, non-gelatinizing hyphae 1.5 μm diam., not continuing beneath the subhymenium. Crystalline layer 60-80 μm thick, of large non-rosettiform crystals interspersed with brown hyphae and amorphous material. Periphysoids 100 x 1.5 μm, numerous, richly-branched, imbedded in gel and forming a very conspicuous layer. Subhymenium 40 μm thick, of small, colorless, angular cells, resting on disintegrating host tissue, J-. Paraphyses numerous, filiform, simple, 1.0 μm diam. below, enlarged to 1.5-2.0 μm at the apex, brown above, J- or weakly J+ blue, exceeding the asci by 15 μm and forming a distinct epithecium. Asci 190-205 x 7-8 (-9) μm, thick-walled when young, the cap 5 μm thick, pierced by a conical pore. Ascospores 8, 180 x 1-1.5 μm, filiform, septate, the cells 5-7 μm long.

On twigs, Algeria and Azerbaijan. Brown paraphyses and very long periphysoids distinguish this species from *S. mollis* and *S. fusca*. *S. viticola* has spores twice as long. The species is named after R. P. Korf, the author's thesis advisor.

SPECIMENS EXAMINED (see also holotype, above): AFRICA: Algeria (MPU, Maire 2306, Ouer-El-Allerg. 22.VII.1914, Duvernoy). ASIA: (K, ex TAA, on wood, Azerbaijan S.S.R. dist. Lezinki, Kaitis 43133)

(124). (STICTIS KUMMERAE) P. Henn., Bot. Jahrb. Syst. 28: 328 (1900)

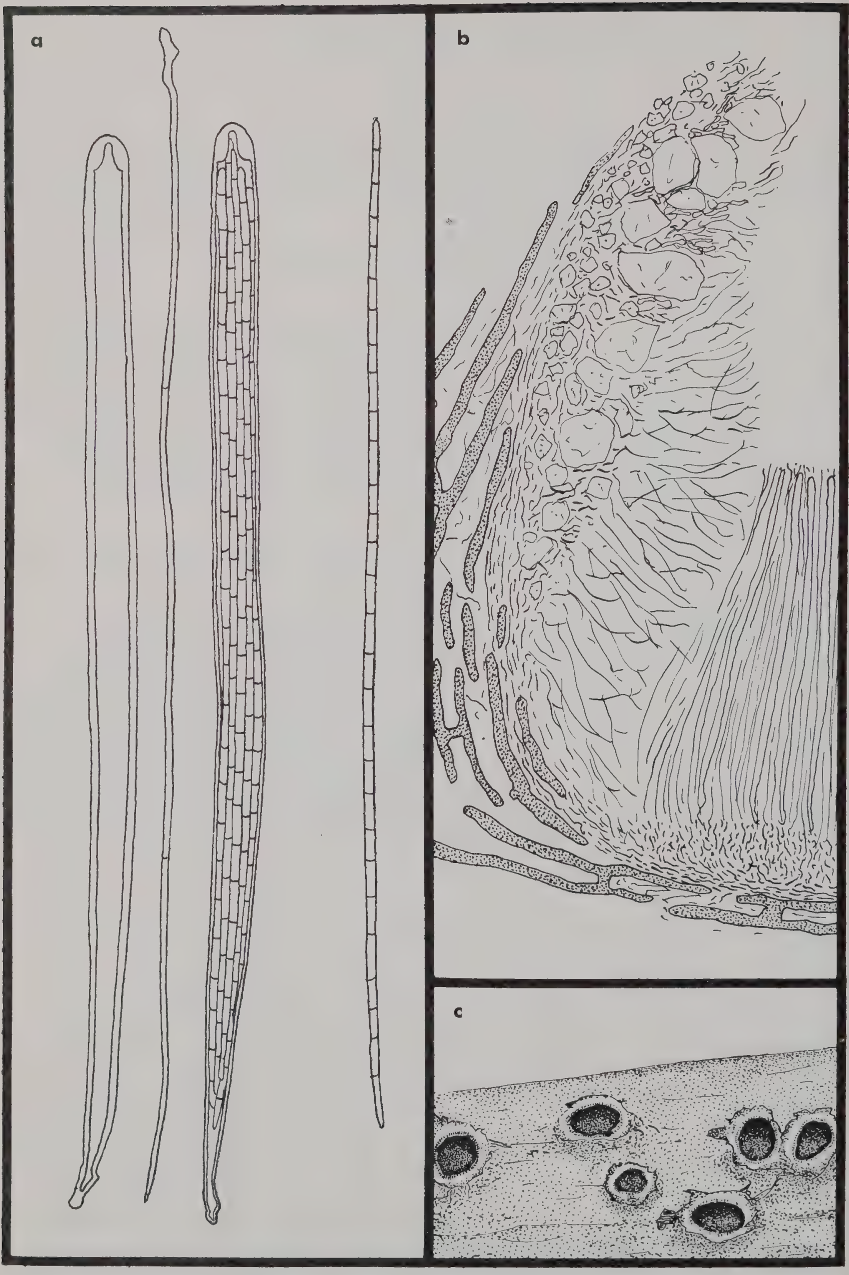

FIGURE 77. *Stictis korfii*. a. Asci, paraphysis, and spores, x750. b. b. Cross section of margin, x225. c. Habit sketch, x7.5. Drawn from the holotype.

No material of this species remains at Berlin, and I have been unable to locate a specimen identified as *Stictis kummerae*. The species was described as occurring in discolored spots on leaves in tropical Africa, and was said to open by teeth. Judging by Henning's statement that the species was allied to *S. quadrifida* and *S. panizzei*, this is probably a *Propolis*. The original description should provide enough information to neotypify the species.

(125). (STICTIS LACERA) Mont., Ann. Sci. Nat. Bot. sér. 4, 14: 180 (1860)
≡ *Cryptodiscus lacer* (Mont.) Sacc., Sylloge Fung. 8: 672 (1889)

I received no specimens in response to a request to PC for the type of this species, and could find no specimen at FH. According to the original description, the species grew on stems of Labiatae and had apothecia 0.5 mm in diameter which opened by teeth. The asci were 80 µm long, paraphysate, and contained 3-septate fusiform spores 10 x 5 µm. The description does not correspond to any species treated by Défago (1967) or by Hein (1976) in their monographs of immersed Dermateaceae. In the absence of any specimen or description of a fungus on a similar host which would correspond to *S. lacera*, I am unable to place the species, other than to suggest that it is probably an immersed member of the Dermateaceae, rather than Ostropalean.

(126). (STICTIS LAMYI) Mont. in Rehm in Rabenh., Krypt.-Fl. ed. 2, 1(3): 145 (1888), pro synon.
≡ *Cryptodiscus lamyi* (Mont.) Rabenh., Bot. Zeitung (Berlin) 9: 454 (1851), sine descr.
≡ *Naevia lamyi* (Mont.) Rehm, l.c.

Apparently based on a manuscript or herbarium name of Montagne's. Neither Rehm (l.c.) nor Rabenhorst (l.c.) cite a Montagne reference, and I have been unable to locate one. A specimen labelled *S. lamyi* in Montagne's herbarium is a *Diplonaevia (=Merostictis)*. The name, however, would appear to be tied to the only specimen mentioned when it was first validly published, by Rehm in 1888. This is a specimen in Winter's herbarium, on *Juncus*. I have not seen it, but according to Rehm (1887-96) it differed from *Stictis* (now *Merostictis*) *circinata* only in having more deeply sunken, lighter colored apothecia.

(127) (STICTIS LANTANAE) Tilak & Nanir
≡ *Schizoxylon lantanae* (Tilak & Nanir) Sherwood, q.v.

(128). STICTIS LANUGICINCTA Fairman in Millspaugh & Nuttall, Publ. Field Columbian Mus. Bot. ser. 5: 341 (1923)

Figure 78

Apothecia at first immersed, opening by a pore, raising the substrate into small pustules but not becoming erumpent, 0.3-0.5 mm broad, the margin brown, grey-pruinose, entire to lacerate, the disc deeply urceolate, brown. Margin in cross

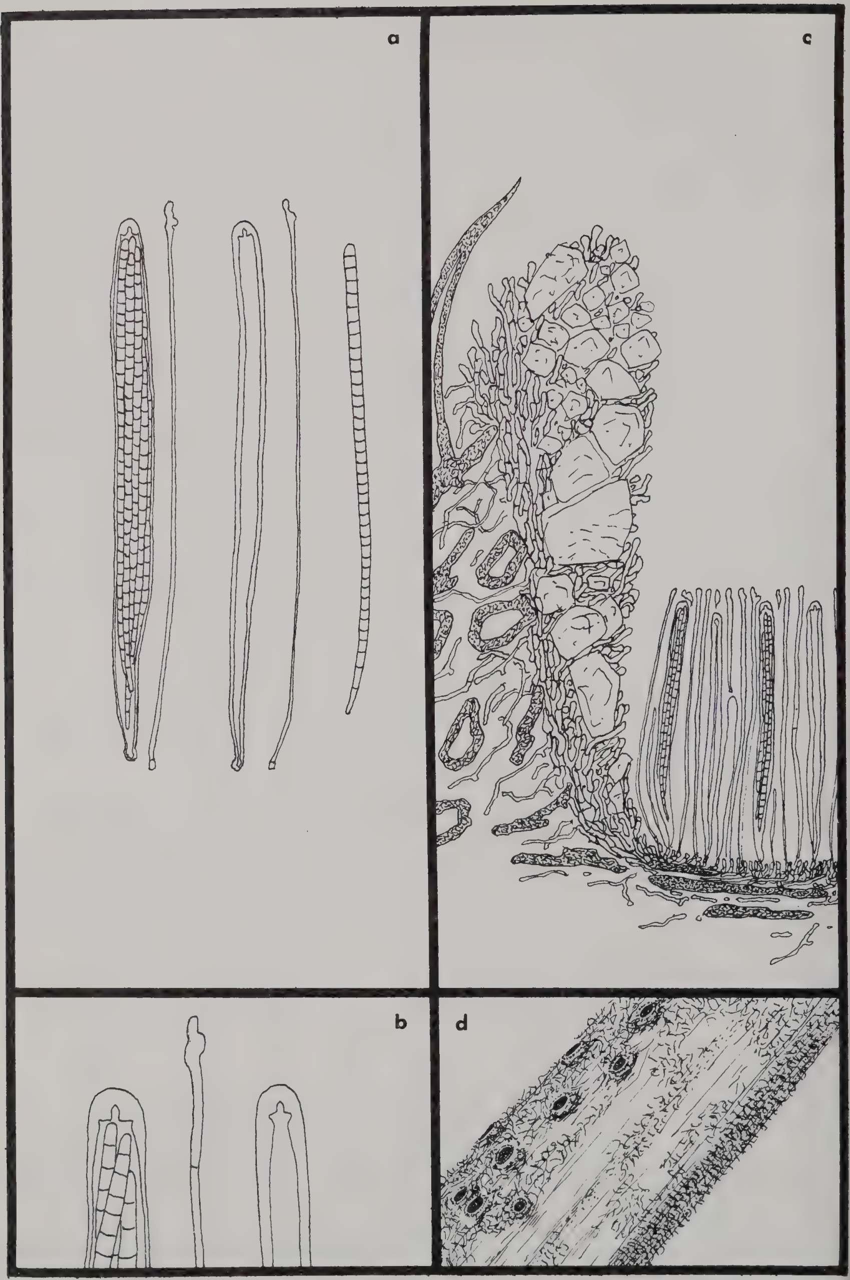

FIGURE 78. *Stictis lanugicincta*. a. Asci, paraphyses, and spores, x750. b. Detail of apices of asci, paraphysis, and spores, x1500. c. Cross section of margin, x375. d. Habit sketch, x7.5. Drawn from the holotype.

section 50-75 μm thick, without a prominent accessory thalline margin, the wall 10-15 μm thick, of interwoven, nongelatinizing hyphae 2.0 μm diam., brown, the crystalline layer prominent, interspersed with brown hyphae; periphysoids brown, 2.0 μm diam., short, not abundant. Hymenium splitting away from the margin when dry. Subhymenium colorless, c. 10 μm thick, of small angular cells, J-. Paraphyses numerous, filiform, 1.0 μm broad below, enlarged to 1.5 μm at the tip, rarely branched, J+ greenish. Asci thick-walled when young, 85-100 x 5-6 (-8) μm, the cap 3.0 μm thick, pierced by a broad pore. Ascospores 8, 80-85 x 2.0 μm, tapered below, not sheathed, septate, the cells 2.0 μm long.

On *Marrubium*, California, USA. Distinguished from *S. caballeroi*, a closely allied species, by the brown paraphysis apices and poorly differentiated periphysoids.

SPECIMEN EXAMINED: NORTH AMERICA: USA (CUP-Fairman 5070, on *Marrubium*, Santa Catalina Island, California, holotype of *Stictis lanugicincta*)

(129). *(STICTIS LECANORA)* (Kunze & Schmidt) Fr.
= *Stictis ocellata* (Pers.) Fr., q.v.

(130). *(STICTIS LEONIS)* Tulasne & Tulasne, Sel. Fung. Carp. 3: 127 (1865)
≡ *Propolis leonis* (Tul. & Tul.) Rehm, Ascomyceten #360 (1876)

This distinctive conifer-inhabiting species, with equilateral, thick-walled, unicellular spores, is a *Propolomyces*. I have not seen original material, but the specimen cited agrees well with the original detailed description.

SPECIMEN EXAMINED: NORTH AMERICA: USA (Herb. Sherwood 2030, on cones of *Pinus*, Oregon, 20.VIII.1975)

(131). *(STICTIS LEPRIEURII)* Mont., Ann. Sci. Nat. Bot. sér. 4, 3: 97 (1855)
≡ *Cryptodiscus leprieurii* (Mont.) Sacc., Sylloge Fung. 8: 672 (1889)
≡ Phaeotrema leprieurii (Mont.) Sherwood, comb. nov.

Four specimens labelled by Montagne as *S. leprieurii* are deposited in Patouillard's herbarium at FH. Three (Leprieur 806, 807, 808) are mentioned in the original description. These appear to represent two different species of *Phaeotrema*. I chose to leave the problem of selection of a lectotype to someone better versed in the systematics of the Thelotremataceae.

(132). *(STICTIS LICHENICOLA)* Mont., Ann. Sci. Nat. Bot. sér. 2, 5: 281 (1836)
≡ *Melittosporium lichenicolum* (Mont.) Massee, Brit. Fungus-Fl. 4: 88 (1895)
= *Diploschistes scruposus* (Schreb.) Norm. var. *parasiticus* (Sommerf.) Zahlbr., Cat. Lich. Univ. 2: 672 (1924)

I have seen none of the original material, but Montagne's figures and description show a fungus with brown

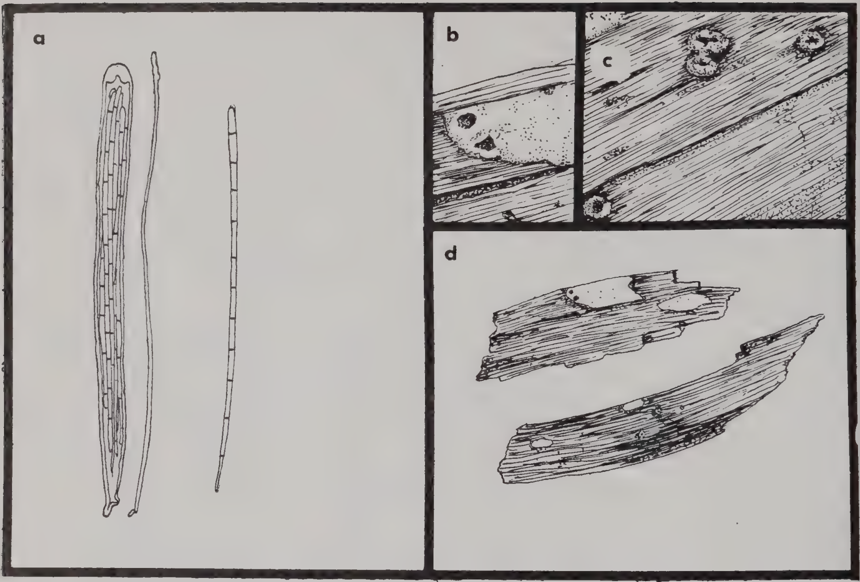

FIGURE 79. *Stictis lichenoides.* a. Ascus, paraphysis, and spores, x750. b. Habit sketch of apothecia imbedded in "thallus", x7.5. c. Habit sketch of solitary apothecia, x7.5. d. Sketch of type specimen, x0.75. Drawn from the holotype.

muriform spores with lenticular cell lumen, a spore type unknown in the Stictidaceae but characteristic of *Diploschistes* (Thelotremataceae).

(133). STICTIS LICHENOIDES Speg., Bol. Acad. Nac. Ci. 11: 276 (1887)

Figure 79

Apothecia at first immersed, soon becoming erumpent and at length nearly superficial, 0.3-0.5 mm diam., solitary or immersed in patches of crystalline material and colorless hyphae of uncertain origin, the margin thick, white-pruinose, involute, the disc deeply urceolate, pale ochraceous. Paraphyses numerous, simple, filiform, not apically enlarged, J-. Asci 75-80 x 5 µm, the cap 3.5 µm thick, pierced by a broad pore. Ascospores 8, 70 x 0.8 µm, septate, the cells 6-7 µm long.

On *"Fagus" (Nothofagus)*, Tierra del Fuego. Known only from an extremely fragmentary type collection. The margin in the apothecium I sectioned was predominantly crystalline and disintegrating. Additional collections of this species, which should be recognizable on ascospore and paraphysis characters, are needed to determine whether the so-called thallus of crystalline material is constantly associated with it.

SPECIMEN EXAMINED: SOUTH AMERICA: Argentina (LPS 28228, on *Fagus*, Isla de los Estados, III-1882, holotype of *Stictis lichenoides*)

(134). *(STICTIS LIGUSTRI)* Schw.
≡ *Schizoxylon ligustri* (Schw.) Sherwood, q.v.

(135). *(STICTIS LINEARIS)* Cke. & Ell., Grevillea 7: 7 (1878)
≡ *Xylogramma lineare* (Cke. & Ell.) Sacc., Sylloge Fung. 8: 678 (1889)

This species, with immersed, elongate black ascocarps, rather thick-walled asci which are J- and lack an obvious apical apparatus, and 3-septate colorless spores, is a typical *Xylogramma.*

SPECIMEN EXAMINED: NORTH AMERICA: USA (CUP-D-9373, Ellis & Everhart, North American Fungi 569, on *Vaccinium* and *Acer*, Feb. 1878. [authentic])

(136). *(STICTIS LONGA)* (Pers.) Fr., Syst. Mycol. 2(2): 594 (1823)
≡ *Hysterium longum* Pers., Syn. Meth. Fung. 1: 99 (1801)
≡ *Xylogramma longa* (Pers.) Rehm in Rabenh., Krypt.-Fl. ed. 2, 1(3): 171 (1888)

I have seen no original material, but it is clear from the published descriptions that this is not a *Stictis.* Phillips (1887) considered the species to be a *Xylographa,* but did not make the combination.

(137). *(STICTIS LOPHODERMOIDES)* Seaver & Waterston
= *Stictis macularis* Berk. & Curt., q.v.

(138). STICTIS LUMBRICUS Sherwood, spec. nov.
Figure 80

Ascocarpi primum immersi, profunde cupulati, 0.3-0.5 mm diam., margine integro, nigro, disco brunneo. Margo in sectione transversali 100 µm crassus, siccus ab hymenio se abrumpens, hypharum pariete 4 µm diam., brunneo. Stratum crystallinum abest. Periphysoidea 25 x 2.0-2.5 µm, non ramosa. Paraphyses filiformes, ramosae, 200 x 1.0 µm, apice ad 3.0 µm incrassatae, brunneae, in iodo non caerulescentes. Asci 200 x 12-16(-20) µm, apice 3-4 µm crassi, 8-spori. Sporae 150-180 x 4.5-6 µm, cellulis 2-4 µm longis.

HOLOTYPUS: BPI, Fungi of West Pakistan 14924, on *Pinus*, Kaghan Valley, Shagran, 16.VII.1951, S. Ahmad.

Etymology: From *Lumbricus*, an earthworm, from the appearance of the broad, closely-septate spores.

Apothecia deeply immersed, opening by a pore, not becoming erumpent, 0.3-0.5 mm diam., the margin entire, narrow, dark grey-pruinose, the disc dark brown, deeply urceolate, splitting away from the margin when dry. Margin in cross section c. 100 µm thick, without a prominent accessory thalline margin, the wall 70 µm thick, of dark, interwoven, non-carbonized hyphae 4.0 µm diam. A distinct crystalline layer is absent, although there are scattered crystals imbedded in the wall, particularly along its upper face. Periphysoids numerous, unbranched, 25 x 2.0-2.5 µm, colorless, J-. Paraphyses numerous, filiform, 1.5 µm diam. below, inflated to 3.0 µm at the tip, branched, apically brown and

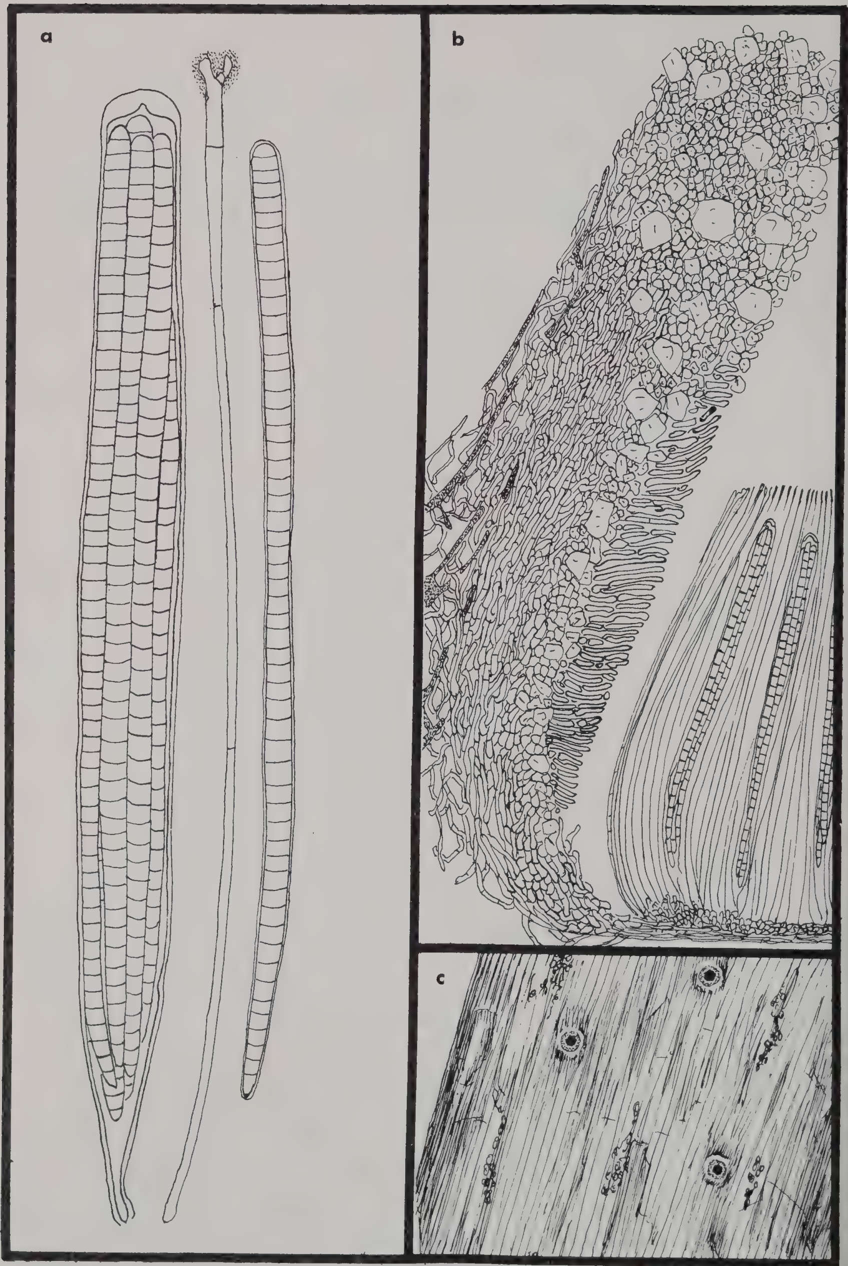

FIGURE 80. *Stictis lumbricus.* a. Ascus, paraphysis, and spores, x750. b. Cross section of margin, x300. c. Habit sketch, x7.5. Drawn from the holotype.

crystalliferous, J-, imbedded in brown amorphous material, forming an epithecium. Marginal paraphyses consisting of a single layer of agglutinated paraphyses which are brown along their entire length. Asci 200 x 12-16 (-20) µm, thick-walled when young, the cap 3.0-4.0 µm thick, pierced by a broad pore, not prominent. Ascospores 8, not obviously sheathed, not coiling when freed from the ascus, 150-180 x 4.5-6 µm, septate, the cells 2-4 µm long.

On decorticated wood of *Pinus*, Pakistan. The species is quite distinct from *S. pachyspora*, the only other species which remotely resembles it. *S. pachyspora* has sheathed, coiling spores, and lacks marginal paraphyses.

SPECIMEN EXAMINED: See holotype, above.

(139). STICTIS LUPINI Phil. & Harkn., Bull. Calif. Acad. Sci. 1: 5 (1885)
= *Stictis valdiviensis* Speg., Contrib. Estud. Hongos Chilensis 130 (1910)

Figure 81

Apothecia at first immersed, opening by a pore, not becoming erumpent, 0.3-0.6 mm diam., the margin thin, white-pruinose, usually entire, the disc deeply urceolate, pale ochraceous. Margin in cross section 50-75 µm thick, without a distinct accessory thalline margin, the wall 10-15 µm thick, of interwoven colorless hyphae 1.5 µm diam., the crystalline layer prominent, of heterogeneous, non-rosettiform crystals. Periphysoidal layer compact, of unbranched hyphae 20-25 x 2.0 µm. Asci 90-100 x 5-6(-8) µm, thick-walled when young, the cap 3.5 µm thick. Paraphyses simple, filiform, 1.0 µm diam, barely enlarged apically, J-. Ascospores 8, irregularly 4-seriate, 45-60 x 3-3.5 µm, tapered below, obscurely sheathed, not coiling when freed from the ascus, septate, the cells 2-5 µm long.

On *Lupinus*, California, and *Lobelia*, Chile. Short, sheathed, closely-septate spores distinguish the species from *S. stellata*, which it otherwise resembles.

SPECIMENS EXAMINED: NORTH AMERICA: USA (K, on *Lupinus*, Harkness 3164, holotype of *S. lupini*)(K, CUP-D-3385, Rabenh.-Wint. F. Eur. 3462, on *Lupinus*, California; CUP-D-9364, Ellis & Everhart, North American Fungi 2?53, on *Lupinus*, California). SOUTH AMERICA: Chile (LPS 28223, on *Lobelia*, Valdivia 1-1909, Spegazzini, holotype of *S. valdiviensis*)

(140). STICTIS LUZULAE Lib.
= *Stictis arundinacea* Pers., q.v.

(141). STICTIS MACROLOMA Dur. & Lév., Expl. Sc. Alg. Atlas pl. 29, f. 6 (1850)

I was unable to locate any original material of *Stictis macroloma*. Judging from this illustration, which is not accompanied by text, this is a species similar to *S. mollis*, with a dark brown margin, brown disc, and asci between 100 and 200 µm long, if the figure is drawn to the same scale as *S. oculiformis (=S. thelotrema* Dur. & Lév.*)*, which appears on the same page. The spores appear filiform and septate, and the paraphyses entirely colorless. It would be desirable to

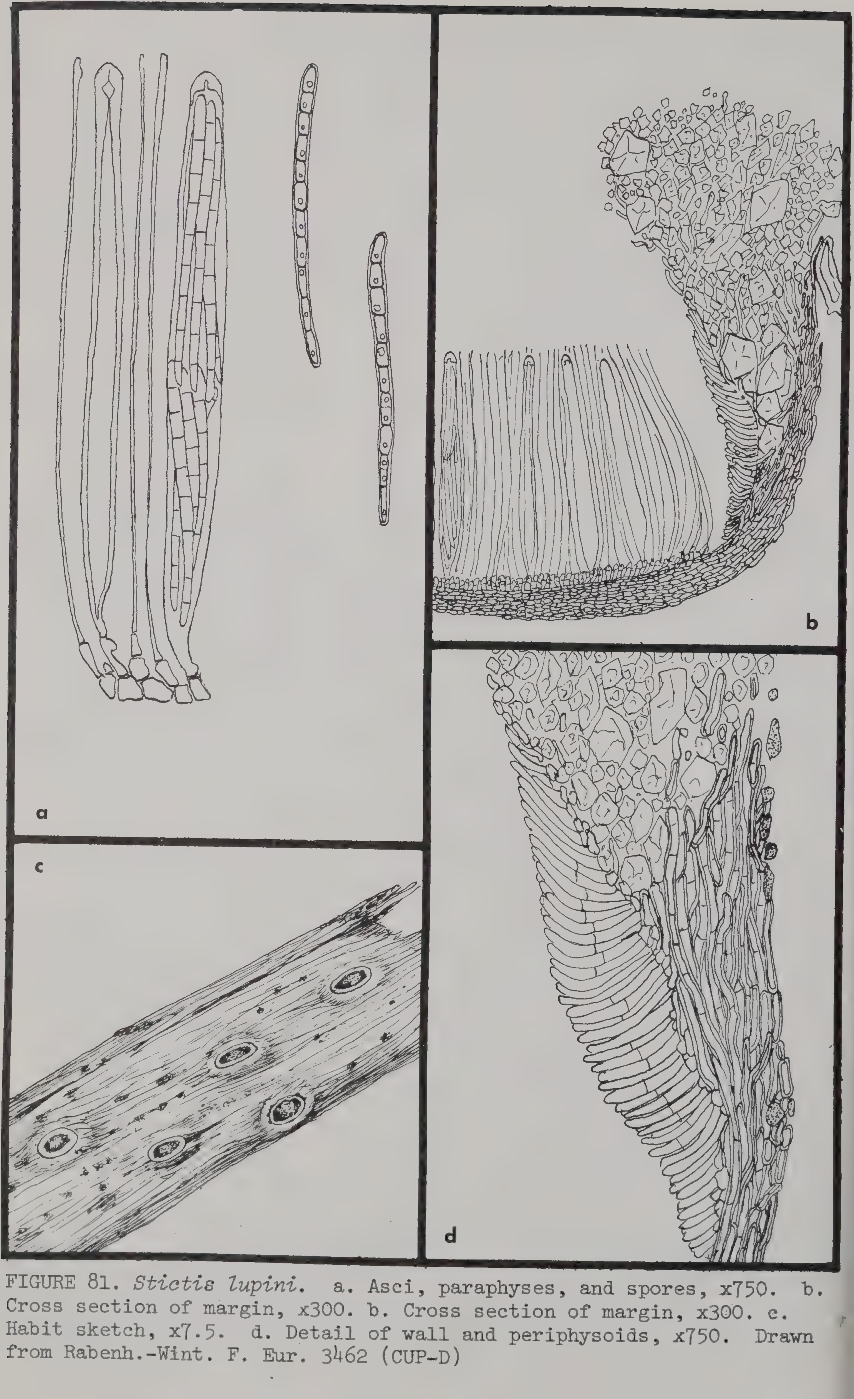

FIGURE 81. *Stictis lupini*. a. Asci, paraphyses, and spores, x750. b. Cross section of margin, x300. b. Cross section of margin, x300. c. Habit sketch, x7.5. d. Detail of wall and periphysoids, x750. Drawn from Rabenh.-Wint. F. Eur. 3462 (CUP-D)

know more about the *Stictis* spp. of Algeria before attempting to neotypify the species.

(142). (STICTIS MACULARIS) Berk. & Curt., J. Linn. Soc., Bot. 10: 371 (1868)
≡ *Naemacyclus macularis* (Berk. & Curt.) Sacc., Sylloge Fung. 8: 702 (1889)
= *Stictis lophodermoides* Seaver & Waterston, Mycologia 32: 400 (1940)

This is a true *Naemacyclus*, opening by splitting the surface of the substrate by a longitudinal slit. The linear fruitbodies occur on whitened patches of grasses and sedges, and have a very reduced margin consisting of 1 layer of globose brown cells. The asci are 50-65 x 8 μm, pointed, J-, thin-walled, and contain 8 acicular, apparently unicellular spores, 55 x 2.0 μm.

SPECIMENS EXAMINED: NORTH AMERICA: Cuba (FH, Curtis Herb. 711, on *Cyperus*, isotype of *Stictis macularis*). Bermuda (NY, on grass, Seaver et al. 1469, holotype of *S. lophodermoides*).

(143). STICTIS MARATHWADENSIS Tilak & Kale, Mycopathol. Mycol. Appl. 38: 381 (1969)

I received no answer to my inquiries to the authors for type or authentic material of this species. According to the original description the species was sometimes white and sometimes black, and had ascospores 220-285 x 0.8-1.6 μm. The illustration suggests that this is indeed a *Stictis* and not *Stictis radiata;* I am unable to characterize it further.

(144). (STICTIS MARITIMA) Rolland, Bull. Soc. Mycol. France 14: 84 (1898)
= *Lasiostictis fimbriata* (Schw.) Bäuml.

For a discussion of this species, see Sherwood (1974).

(145). STICTIS MAYDIS P. Henn., Hedwigia 41: 305 (1902)

No original material remains at Berlin, and I have been unable to locate any specimens identified as *S. maydis*. According to the original description, the species occurred on bleached spots on leaves of *Zea mays*, opened by splitting the substrate irregularly, and had asci 35-55 x 5-7 μm containing spores 30-50 x 1.5 μm, surrounded by filiform, branched paraphyses. It is not clear from the description whether this is a *Propolis*, *Karstenia*, or *Stictis* similar to *Stictis javanica* (q.v.).

(146). STICTIS MEGARRHIZAE Phil. & Harkn.
= *Stictis monilifera* Phil. & Harkn., q.v.

(147). (STICTIS MICROSTICTA) Mont., Ann. Sci. Nat. Bot. sér. 4, 3: 97 (1855)

I was unable to obtain any specimen labelled *S. microsticta* from either PC or FH. According to the original description the species had fruitbodies c. 0.25 mm diam., a stellate, white margin, pruinose hymenium, and linear, 4-

septate, colorless spores. Montagne (l.c.) distinguished *S. microsticta* from *S. leprieurii* on the basis that the former had a pruinose, blue-grey hymenium. *S. microsticta* may well be a lichen in the Thelotremataceae, but it cannot be characterized from the description alone.

(148). (STICTIS MICROSTOMA) Carm. apud. Berk. in Hooker
≡ *Cryptodiscus microstomus* (Carm. apud. Berk. in Hooker) Sacc., q.v.

(149). (STICTIS MINIATA) Niessl in Gola, Atti Acad. Sci. Veneto Trent. Istriana 21: suppl. 1, 139 (nom. nud.)

A specimen is listed in the catalogue of Saccardo's herbarium (Gola, l.c.) as a type, but the name seems to be otherwise unpublished. The specimen is apparently an immature, immersed Dermateaceous fungus.

SPECIMEN EXAMINED: (PAD, on *Eryngium*, sine loc., Niessl)

(150). STICTIS MINIMA Sacc. & Speg.
= *Stictis stellata* Wallr., q.v.

(151). STICTIS MINOR Sherwood, spec, nov.

Figure 82

Ascocarpi primum immersi, profunde cupulati, 0.4-0.7 mm diam., margine integro vel lacerato, albo, disco pallide ochraceo. Margo in sectione transversali 100 µm crassus, siccus ab hymenio se abrumpens, hypharum pariete 1.5 µm diam., achromo. Stratum crystallinum 80 µm crassum. Periphysoidea 15 x 1.5 µm, non ramosa. Paraphyses filiformes, simplices, 80 x 1.0 µm, in iodo non caerulescentes. Asci 75-85 x 3.0-3.5(-4) µm, apice 1.5 m crassi, 8-spori. Sporae 18-22 x 2.0 µm, cellulis 5-6 µm longis.

HOLOTYPUS: MAC, on poplar [*Populus*] log, Dearness and Bisby. [locality presumably in the vicinity of MAC in Winnipeg, Manitoba].

Etymology: The epithet *minor* (lesser) refers to the small asci and spores rather than to the overall dimensions of the ascocarp.

Apothecia at first immersed, opening by a pore, not becoming erumpent, 0.4-0.7 mm diam., orbicular, the margin white-pruinose, entire to lacerate, moderately prominent, the disc deeply urceolate, pale ochraceous, splitting away from the margin when dry. Margin in cross section up to 100 µm thick, without a prominent accessory thalline margin, the wall 10 m thick, poorly differentiated, of interwoven colorless hyphae 1.5 µm diam. Crystalline layer 80 µm thick, prominent, of small, uniform, colorless crystals. Periphysoids 15 x 1.5 µm, unbranched, not markedly gelatinous, J-. Subhymenium c. 10 µm thick, of small colorless angular cells, resting directly on disintegrating host tissue. Paraphyses numerous, simple, filiform, 1.0 µm broad, not enlarged apically, J-. Asci 75-85 x 3.0-3.5(-4) µm, the cap 1.5 µm thick, with a narrow pore. Ascospores 8, irregularly bi-

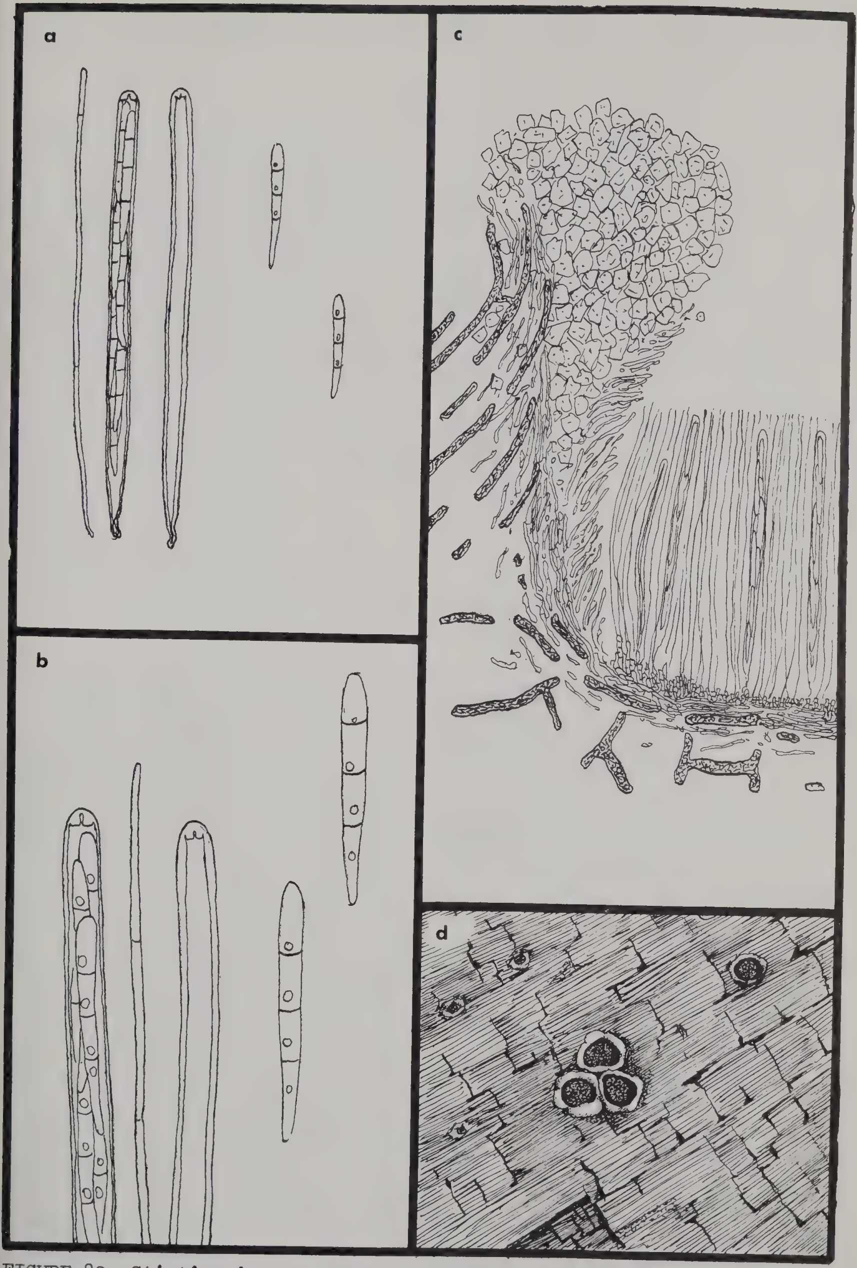

FIGURE 82. *Stictis minor*. a. Asci, paraphysis, and spores, x750. b. Detail of apices of asci, paraphysis, and spores, x1500. c. Cross section of margin, x375. d. Habit sketch, x7.5. Drawn from the holotype.

seriate, 18-22 x 2.0 µm, 3-septate.

On *Populus*, Canada? Despite the 3-septate spores, this is a typical *Stictis*.

SPECIMEN EXAMINED: See holotype, above.

(152). STICTIS MOELLERIANA P. Henn., Hedwigia 41: 17 (1902)

No specimen of this fungus remains at Berlin, and I have been unable to locate any specimen identified as *S. moelleriana*. According to the original description, the apothecia were approximately 1.0 mm diam., had a white-pruinose margin, and occurred on twigs at St. Catharine, Brazil. The asci were 600 x 16-20 µm and contained spores 380-430 x 7-9 µm, the cells 8-12 µm long. *Stictis xenospora* is the only species of *Stictis* or *Schizoxylon* with spores approaching these dimensions; it has spores which do not exceed 6.5 µm in breadth and are so obviously sheathed that it is difficult to believe that this character would have been overlooked by Hennings, whose description is otherwise fairly detailed. There should be no difficulty in recognizing *S. moelleriana* if it is recollected.

(153a). STICTIS MOLLIS Pers., Myc. Eur. 1: 337 (1822), subsp. *MOLLIS*
= *Stictis ollaris* Wallr., Fl. Crypt. Germ. 2: 444 (1833)
= *Stictis opuntiae* Rolland, Bull. Soc. Mycol. France 7: 212 (1891)

Figure 83

Apothecia at first immersed, opening by a pore, becoming partially erumpent, 0.5-1.2 mm diam., the margin massive, black, moderately grey-pruinose, entire, the disc deeply urceolate, brown. Margin in cross section 100-150 µm thick, without a prominent accessory thalline margin, the wall 50-75 µm thick, of interwoven non-carbonized brown hyphae 2.0 µm diam., rather gelatinous when wet. Crystalline layer poorly defined. There are some large crystals imbedded in the wall layer, and the outer face of the wall is crystalliferous. Subhymenium 10 µm thick, of small, colorless, angular cells, resting on a narrow extension of the brown wall layer, J-. Periphysoids 20-25 x 1.5 µm, mostly unbranched, sparse and inconspicuous. Paraphyses numerous, filiform, colorless to faintly brown at the apex, J-, not enlarged or branched above. Asci thick-walled when young, 150-200 x 7(-11) µm, the cap 3.0 µm thick, pierced by a broad pore. Ascospores 8, 150-180 x 2.0-2.5 (-3) µm, tapering somewhat below, septate, the cells 3-4 µm long.

On corticate and decorticated wood, Europe, Africa, and western North America. I have been unable to confirm any of the numerous reports from eastern North America. Many of the earlier reports are based on *Stictis sphaeroboloidea*.

Stictis pupula (q.v.), widely cited as a synonym, cannot, on the basis of material now deposited in the Friesian herbarium, be identified with *S. mollis*. As noted in the discussion of *Schizoxylon albo-atrum*, the names *St. mollis* and *St. pupula* were used by Persoon and Fries for a number of different fungi. Persoon included specimens of *Schizo-*

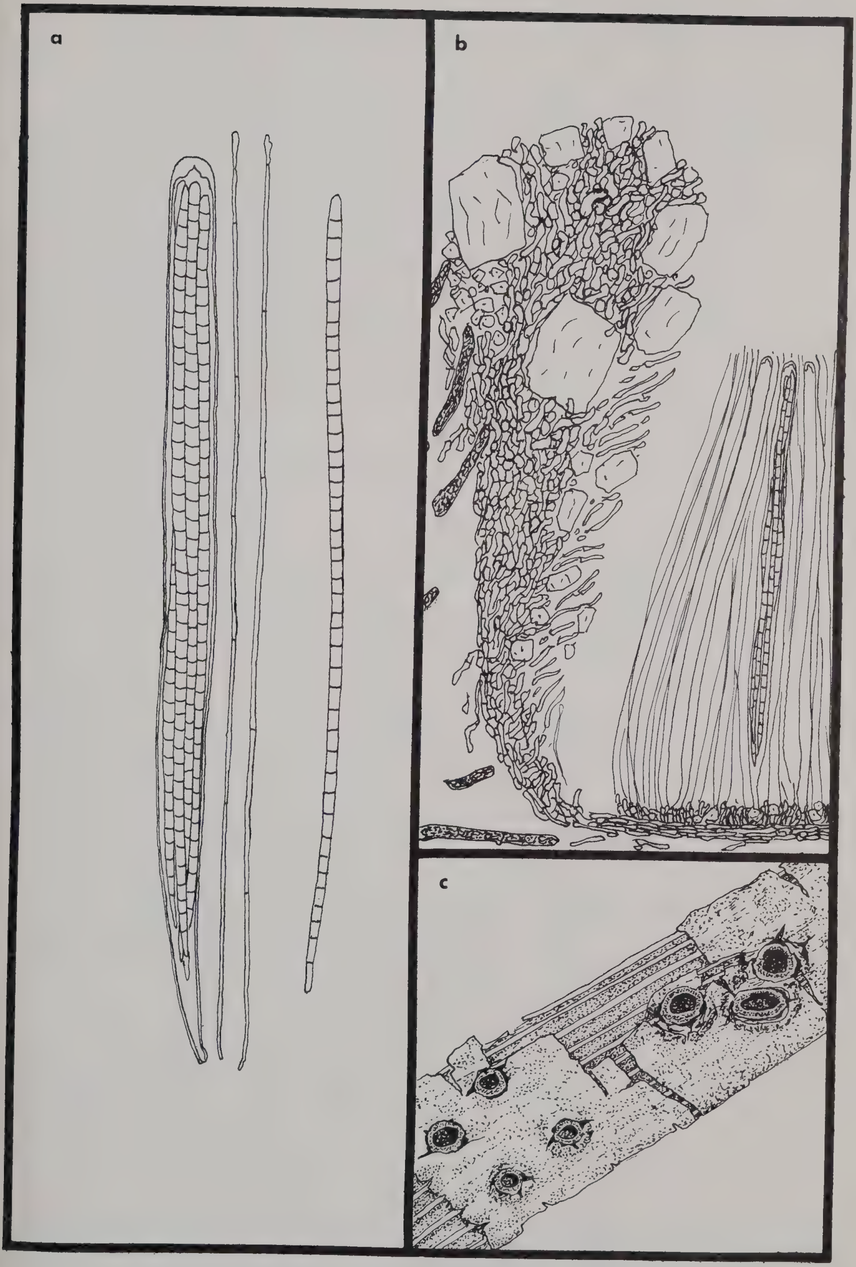

FIGURE 83. *Stictis mollis*. a. Ascus, paraphyses, and spores, x750. b. Cross section of margin, x375. c. Habit sketch, x7.5. Drawn from Rehm, Ascomyceten 22 (CUP-D).

xylon berkeleyanum and two different pyrenomycetes in his herbarium under the name *Stictis mollis.* I have chosen a type (since the specimen has no collection data, it is unclear whether this is a lectotype or neotype) which preserves the current usage of the name. No material of *S. ollaris* remains in Wallroth's herbarium at Strasbourg; I have followed Rehm's (1887-96) synonymy.

SPECIMENS EXAMINED: EUROPE: locality uncertain (L, herb. Persoon 910. 264-828, lectotype or neotype of *Stictis mollis*)(CUP-D 6691, Rehm Ascomyceten 22). France (FH, herb. Patouillard, on *Opuntia,* Golfe Juan, Rolland, holotype of *S. opuntiae*). Germany (B, Münster, det. by Rehm as *S. ollaris,* neotype, designated here, of *S. ollaris*). Norway (O, Malmoe, November 1840; on *Ulmus,* sine loc.; Ringeboe, on *Salix,* Sommerfelt II.1838). Sweden (UPS, Rommell 8.VII.1884)(CUP-D 120, on *Ligustrum,* Rommell 17.VII.1889). Greece? (G, on *Myrtus,* Ile de Levant, Müller 1859). AFRICA: South Africa (K, Boschberg, MacOwan 9/1883). Algeria (MPU, on *Reraia,* Atlas Mts., Bertault & Malençon, 9.III.1961). NORTH AMERICA: USA (NY, Ellis 259, on *Picea,* Colorado)

(153b). STICTIS MOLLIS Pers. subsp. POPULORUM Sherwood, subsp. nov.

Figure 84

Ascocarpi primum immersi, profunde cupulati, 0.5-1.0 mm diam., margine integro, albo, disco brunneo. Margo in sectione transversali 150-200 µm crassus, siccus ab hymenio se abrumpens, hypharum pariete 2.0 µm diam., brunneo. Paraphyses filiformes, simplices, in iodo non caerulescentes. Asci 150-200 x 6-8 µm, apice 3.0 µm crassi, 8-spori. Sporae 150-180 x 2.0 µm, cellulis 4-6 µm longis.

HOLOTYPUS: H, on *Populus tremula* L., Inari Lappland, mesic alluvial woodlands by river Kaamasjoki, 23.VIII.1974. T. Ahti 29717.

Among collections of *Stictis radiata* from Scandinavia I encountered several specimens which proved, on closer inspection, to have dark marginal hyphae and a J- hymenium. These collections occurred on weathered decorticated wood and had a very thick, white-pruinose margin, and are referred here to *Stictis mollis* subsp. *populorum.* The subspecies differs from typical *S. mollis* in having more abundant periphysoids and somewhat narrower spores, and in occurring on decorticated wood rather than on bark.

SPECIMENS EXAMINED (See also holotype, above): Finland (H, HPP 7667, on *Sorbus,* Laurila 2.III.1937; HPP 7663, on *Populus,* Laurila 11.VIII.1936; HPP 7665, on *Populus,* Laurila 23.VI.1936). Sweden (UPS, herb. Fries, Småland, Femsjö). Norway (O, on *Ulmus,* Sommerfelt; on *Populus,* Linderun, XI.1840)

(154). STICTIS MONILIFERA Phil. & Harkn., Grevillea 12: 83 (March, 1884)

= *Stictis araucariae* Phil. & Harkn., Grevillea 13: 22 (Sept. 1884)

= *Stictis megarrhizae* Phil. & Harkn., *ibid.*

Figure 85

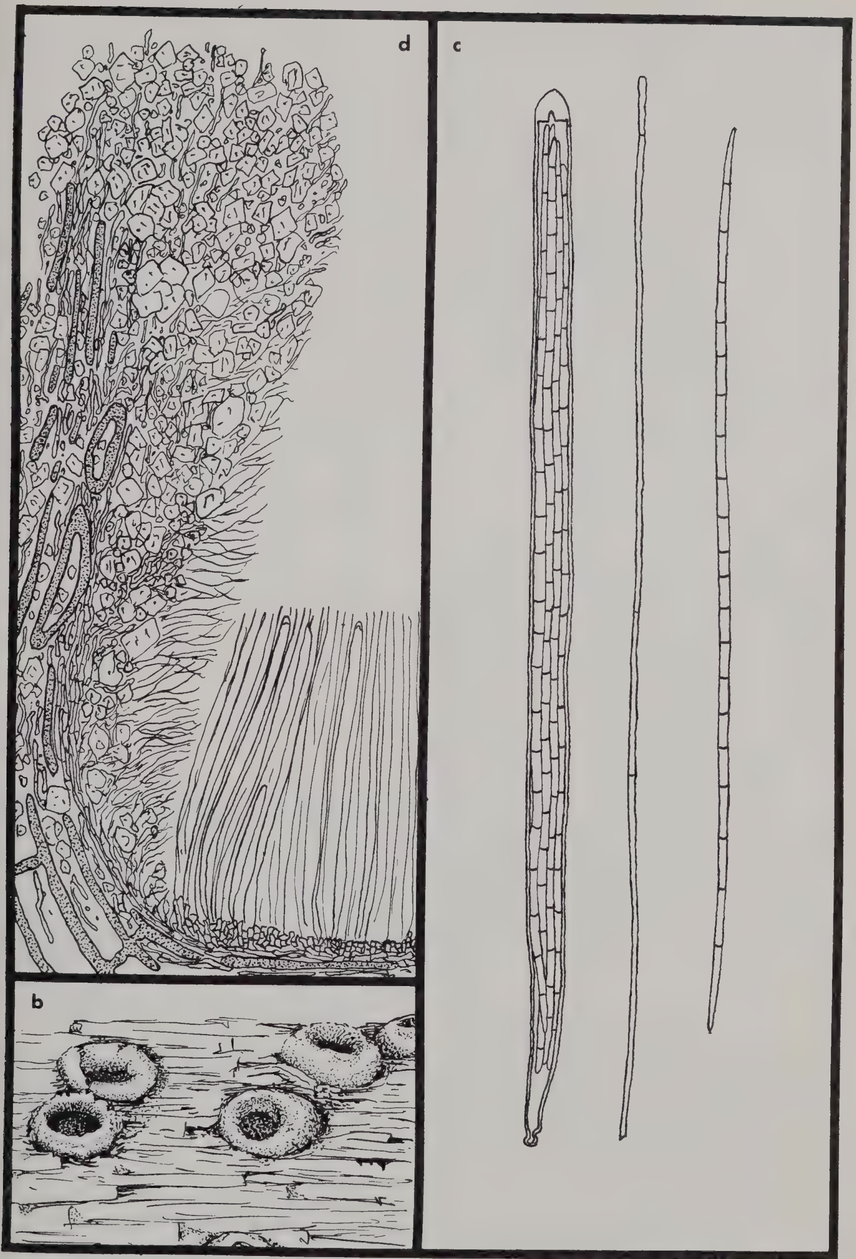

FIGURE 84. *Stictis mollis* subsp. *populorum*. a. Cross section of margin, x225. b. Habit sketch, x7.5. c. Ascus, paraphysis, and spores, x750. Drawn from the holotype.

Apothecia at first immersed, opening by a pore but not becoming erumpent, 0.2-0.5 mm diam., the margin entire to lacerate, white-pruinose, prominent, the disc deeply urceolate, pale ochraceous. Margin in cross section 100 μm thick, without a prominent accessory thalline margin, the wall 50 μm thick, of colorless loosely-interwoven hyphae 1.5 μm diam. immersed in a gel, sometimes appearing dilute brown due to the inclusion of amorphous brown material. Crystalline layer prominent, of rather small, uniform crystals. Periphysoids 10 x 1.5 μm, sometimes branched, immersed in a gel, forming a compact layer. Hymenium entirely J-. Subhymenium 15 μm thick, of small, colorless, angular cells, resting on disintegrating host tissue. Paraphyses 1.0 μm thick, not enlarged above, simple or once-branched, not propoloid. Asci 95-110 x 5(-6.5) μm, the cap 2.0 μm thick, pierced by a conical pore. Spores 8, cylindrical, 90 x 2.0 μm, septate, constricted at the septa and showing some tendency to disarticulate when old, the cells 2-2.5 μm long.

On herbaceous stems, woody capsules, and conifer needles, California. Needles of the *Araucaria* species concerned are woody and remain on the tree long after senescence. The other species of *Stictis* with ascospores of these dimensions all have pigmented margins.

SPECIMENS EXAMINED: NORTH AMERICA: USA (all from California):(CUP-D 7640, on *Pittosporium*, Rabenh.-Wint. F. Eur. 3364, Harkness; D-9365, on *Pittosporium*, Ellis,& Everhart, North American Fungi 2054, Harkness; D-7639, on *Megarrhiza*)(FH, Parks 5617, on *Marah (=Megarrhiza)*, ex UC) (K, on *Megarrhiza*, Harkness 2057, holotype of *Stictis megarrhizae*; on *Araucaria*, Harkness 2524, holotype of *S. araucariae*).

(155). STICTIS MONTAGNEI Dur. ex Mont., Ann. Sci. Nat. Bot. sér. 3, 12: 316 (1849)

The species was based on an illustration (misidentified as *Tympanis lonicerae* Fr.) which appeared in Ann. Sci. Nat. Bot. sér. 2, 5: 283 (1836). This species came to my attention too late to inquire about specimens. The illustration suggests it is near *S. arundinacea*.

(156). STICTIS MUSAE Seaver & Waterston
= *Stictis radiata* Pers., q.v.

(157). (STICTIS MYRICAE) Cash, Mycologia 50: 655 (1959)
= *Propolis phacidioides* (Fr.) Corda

For a discussion of this species, a member of the Phacidiales, see Sherwood (1977).

(158). (STICTIS NIESSLII) Roum., F. Gall. Exs. 3936 (1887)
= *Merostictis emergens* (Karst.) Clements

The synonymy is taken from Défago (1967). See also *Stictis emergens*.

(159). (STICTIS NIGRELLA) Sommerf.
= *Schizoxylon nigrellum* (Sommerf.) Sherwood, q.v.

(160). (STICTIS NIVEA) Pers., Myc. Eur. 1: 339 (1822)

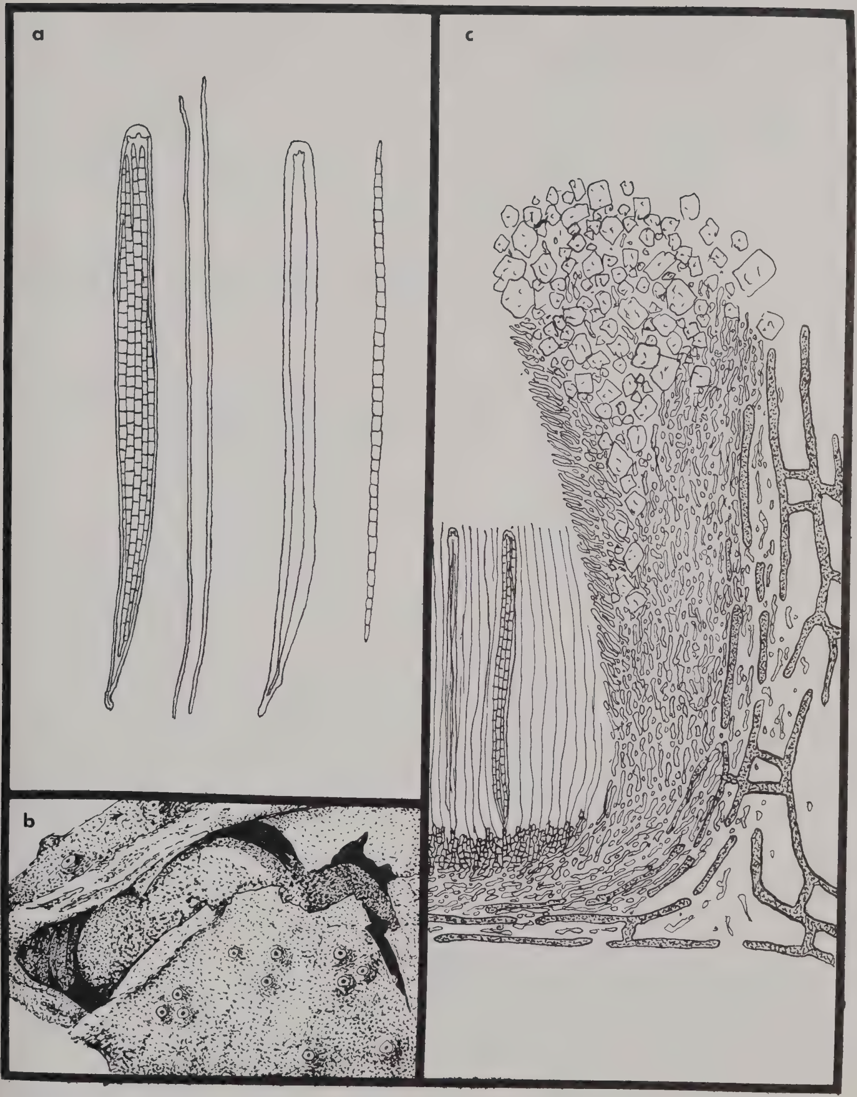

FIGURE 85. *Stictis monilifera.* a. Asci, paraphyses, and spores, x750. b. Habit sketch, x7.5. c. Cross section of margin, x375. Drawn from CUP-D 7641.

≡ *Naemacyclus niveus* (Pers.) Sacc., Botan. Centralbl. 18: 251 (1884)

See *Naemacyclus*, above.

(161). (STICTIS OBVELATA) (de Lacroix in Rabenh.) de Not.
= *Merostictis seriata* (Lib.) Défago

The synonymy is taken from Défago (1967). The species is a member of the Dermateaceae. See *Stictis seriata.*

(162). (STICTIS OCELLATA) (Pers.) Fr., Syst. Mycol. 2(1): 195 (1822)
≡ *Peziza ocellata* Pers., Syn. Meth. Fung. 667 (1801)
≡ *Ocellaria ocellata* (Pers.) Schroet., Krypt.-Fl. Schlesien 3(2): 150 (1893)
= *Peziza lecanora* Kunze & Schmidt, Deutschlands Schwämme Exs. 174 (1817)
  ≡ *Stictis lecanora* (Kunze & Schmidt) Fr., Syst. Mycol. 2(1): 193 (1822)
= *Ocellaria aurea* Tulasne & Tulasne, Sel. Fung. Carp. 3: 129 (1865)

I base the above synonymy on the literature; I have seen no original material of *Peziza ocellata.* Additional synonyms are given by Seaver (1951). See also *Ocellaria,* above.

SPECIMEN EXAMINED: EUROPE: Germany (FH, Kunze & Schmidt, Exs. 174, isotype of *Peziza lecanora*)

(163). STICTIS OCULIFORMIS Sacc., Sylloge Fung. 8: 686 (1889)
≡ *Stictis thelotrema* Dur. & Lév., Expl. Fl. Alg. Atlas pl. 29 f. 3 (1850) non *S. thelotrema* Mont. (1841)

Figure 86

Apothecia at first immersed, opening by a pore and raising the substrate into pustules but not becoming erumpent, 0.4-0.7 mm broad, orbicular, the margin dark, scarcely pruinose, entire, the disc deeply urceolate, dark brown. Thalline margin prominent, dark brown, of crystalline material, brown interwoven hyphae 1.5 µm diam., and disintegrating host tissue. There is no differentiated periphysoidal layer, but the hymenium does split away from the margin when dry. Subhymenium of small, angular, colorless cells, resting directly on host tissue, 10 µm thick, J+ faintly blue. Paraphyses numerous, filiform, exceeding the asci by 5 µm and forming an epithecium, 1.0 µm broad below, enlarged to 1.5 - 2 µm at the apex which is richly branched, brown, and J-. Marginal paraphyses forming an agglutinated layer 2 cells thick, brown throughout their entire length. Asci 100-110 x 6.0(-7) µm, thick-walled when young, the cap 5.0 µm thick, pierced by a broad conical pore. Ascospores 8, 85-95 x 1.5 µm, septate, the cells 5-8 µm long.

On wood, Algeria. The species may be viewed as transitional between *Stictis* and *Schizoxylon.* The lectotype specimen seems to be the one illustrated in the original description.

SPECIMENS EXAMINED: AFRICA: Algeria (PC, on *Callitris*, lectotype, designated here, of *Stictis oculiformis*; on *Phylleria*, Oran, Fevrier 1842, lectoparatype)

(164). (STICTIS OLEAE) de Not., Mem. Accad. Torrino 3: 55 (1841)

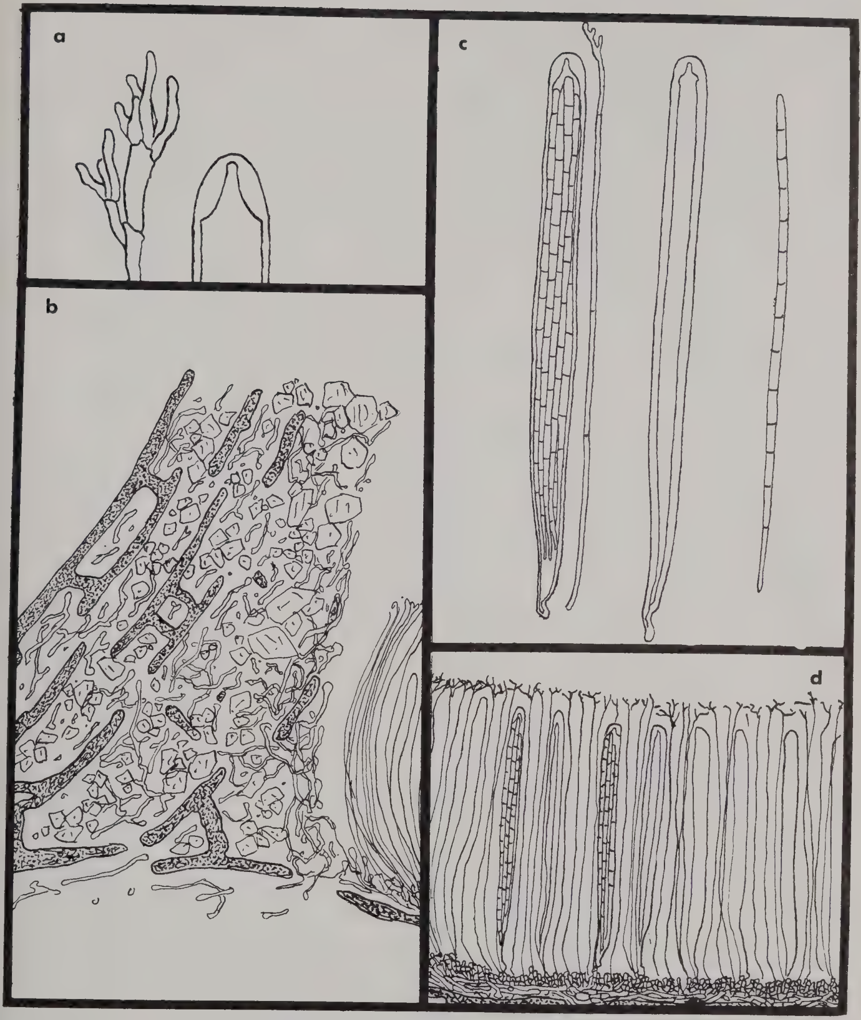

FIGURE 86. *Stictis oculiformis*. a. Detail of apices of an ascus and a paraphysis, x1500. b. Cross section of margin, x300. c. Asci, paraphysis, and spores, x750. d. Hymenium, x750. Drawn from the lectotype.

= *Trochila oleae* (de Not.) Fr., Summa Veg. Scand. sect. post. 367 (1849)

On leaves. The description suggests that the species is correctly assigned to *Trochila*. I received no answer to inquiries for the specimen.

(165). *STICTIS OLLARIS* Wallr.
= *Stictis mollis* Pers., q.v.

(166). STICTIS OSTROPOIDES Sherwood, spec. nov.

Figure 87

Ascocarpi primum immersi, profunde cupulati, 0.8-1.5 mm diam., margine integro, griseo, disco pallide ochraceo. Margo in sectione transversali 80 µm crassus, siccus ab hymenio se abrumpens, hypharum pariete 1.5 µm diam., achromo. Stratum crystallinum abest. Periphysoidea 80 x 1.5-2.0 µm, ramosa, brunnea. Paraphyses filiformes, simplices, 200-220 x 1.0 µm, in iodo non caerulescentes. Asci 200-220 x 6.0 (-8) µm, apice 5-6 m crassi, 8-spori. Sporae 190-200 x 2.0 µm, cellulis 2.5-3.5 µm longis.

HOLOTYPUS: CUP 54907, on dead branches of *Lonicera* cfr. *involucrata,* Devil's Elbow State Park, Lane Co. Oregon USA. August 13, 1975. Isotypi: K, OSC, Herb. Sherwood 2184.

Etymology: from *Ostropa,* because the fruitbodies, which open by a slit, somewhat resemble those of that genus.

Apothecia at first immersed, opening by splitting the overlying bark into irregular lobes, elongate, c. 0.8-1 x 1-1.5 mm diam., pale grey-pruinose, the margin remaining for a long time closed and finally opening by a longitudinal slit, the disc deeply urceolate, pale ochraceous. Hymenium splitting away from the margin when dry. Margin in cross section c. 80 µm thick, consisting of tightly-packed, gelatinous, branched periphysoids 80 x 1.5-2.0 µm, brown, the wall and crystalline layers nearly obsolete. The margin remains for a long time closed, and splits away from the surrounding wood, so that it appears annulate. Subhymenium c. 10 µm thick, of small, colorless, angular cells resting directly on host tissue. Paraphyses numerous, filiform, 1.0 µm broad below, simple, colorless, not enlarged above, J-. Asci 200-220 x 6(-8) µm, the cap 5-6 µm thick, pierced by a complex pore. Ascospores 8, 190-200 x 2.0 µm, the cells 2.5-3.5 µm long.

On *Lonicera* and *Scrophularia,* western North America. Apparently quite common. This is a distinctly coastal species. One might suppose this species with a annulate margin on *Lonicera* to be *Stictis annulata,* but I have not found a single example of it in type or authentic collections of that species. A thick ascus cap, simple paraphyses, and shorter, more closely-septate spores distinguish *S. ostropoides* from *S. chrysopsis,* the other member of sect. *Lichenopsis* which occurs on the west coast of North America.

SPECIMENS EXAMINED (see also holotype, above): NORTH AMERICA: USA (UC-Parks 7002, on *Scrophularia,* California; Parks 5506, on *Lonicera,* California)(CUP-54904, on *Lonicera,* Oregon)(Herb. Sherwood 2146, on *Lonicera,* Oregon)

(167). *STICTIS PACHYSPORA* (Rehm) Rehm in Rabenh., Krypt.-Fl. ed. 2, 1(3): 175 (1888)

≡ *Schmitzomia pachyspora* Rehm, Ber. Naturhist. Vereins Augsberg 26: 102 (1881)

Figure 88

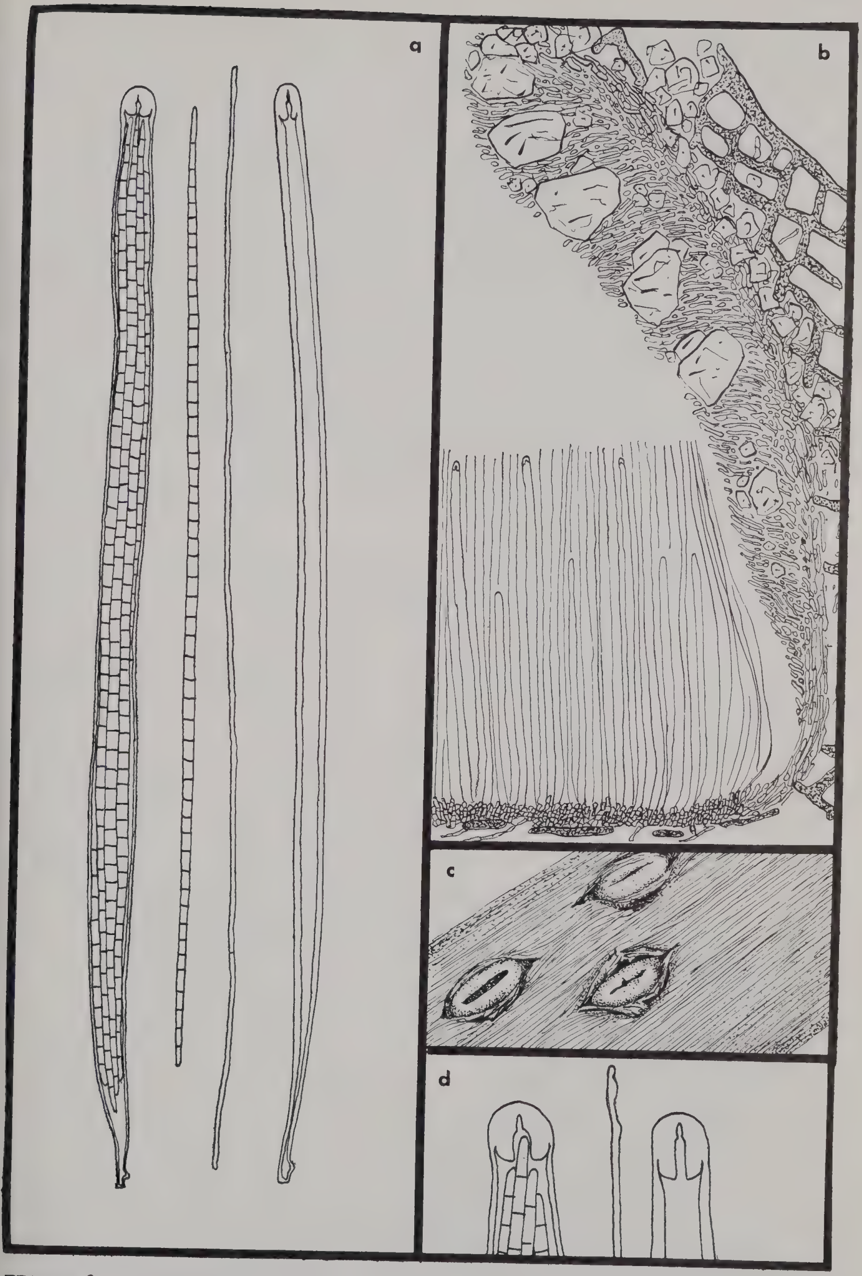

FIGURE 87. *Stictis ostropoides*. a. Asci, paraphysis, and spores, x750. b. Cross section of margin, x225, c. Habit sketch, x7.5. d. Detail of apices of asci, paraphysis, and spores, x1500. Drawn from CUP-54541 (= Parks 7002)

Apothecia at first immersed, opening by a pore but not becoming erumpent, 0.5-0.8 mm broad, orbicular, the margin entire, dark brown, moderately white-pruinose, the disc deeply urceolate, dark ochraceous to brown. Margin in cross section 160 μm thick, with a poorly developed accessory thalline margin of hyphae and disintegrating host tissue, the wall 20 μm thick, of closely interwoven light brown hyphae 1.5-2 μm diam. Crystalline layer up to 150 μm thick, of pedominantly large, non-rosettiform crystals. Periphysoids 30 x 1.5 μm, not markedly gelatinous, branched, J-. Subhymenium colorless, of small angular cells, 15 μm thick, J-. Paraphyses filiform, numerous, exceeding the asci by 5 μm, 1.0 m broad below, inflated to 1.5-2 μm above, 1-2 times branched apically, brown, not propoloid, J-. Asci 275-330 x 10-12 (-15) μm, the cap 5-5.5 μm thick, pierced by a broad pore. Spores a little shorter than the asci, 4.5-5.0 μm broad, tapering at both ends, septate, slightly constricted at the septa, sheathed, coiling when freed from the ascus, the cells 2-4 μm long.

On bark, Europe. This distinctive species is apparently rare. Goree (1972) discusses the differences between *S. pachyspora* and *S. serpentaria*.

SPECIMENS EXAMINED: EUROPE: Germany (B, CUP-D-7645, Rehm Ascomyceten 420, on *Pinus*, Augsberg 3/1877, isotypes of *Stictis pachyspora*). Norway? (O, on *Populus*, Sommerfelt 4/1823, sine loc.)

(168). (STICTIS PALLIDA) Pers.
≡ *Cryptodiscus pallidus* (Pers.) Corda, q.v.

(169). STICTIS PALLIDULA Sacc.
= *Stictis stellata* Wallr., q.v.

(170). (STICTIS PANIZZEI) de Not., Comment. Soc. Crittog. Ital. 1: 362 (1861)
≡ *Propolis panizzei* (de Not.) Sherwood, Mycotaxon 5: (1977)

For a redescription of the species, a member of the Phacidiales, see Sherwood (1977).

(171). (STICTIS PARALLELA) (Ach.) Fr.
= *Stictis abietina* (Pers.) Farlow, q.v.

(172). (STICTIS PARASITICA) Ell. & Everh., J. Mycol. 4: 54 (1888)
≡ *Propolis parasitica* (Ell. & Everh.) Sacc., Sylloge Fung. 8: 653 (1889)
≡ Hyaloscypha parasitica (Ell. & Everh.) Sherwood, comb. nov.

Apothecia minute, sessile, 0.2-0.3 mm broad, white, externally hairy, the disc white, shallowly cupulate. Ectal excipulum pale brown, pseudoparenchymatous, with short, angular cells. Hairs numerous, 30-35 μm long, 3 μm broad at the base, tapering abrubtly to a long, acuminate, straight tip, colorless. Asci thin-walled, J-, 25-30 x 5-6 μm. Ascospores 8, unicellular, colorless, 6-8 x 2.5 μm. Paraphyses

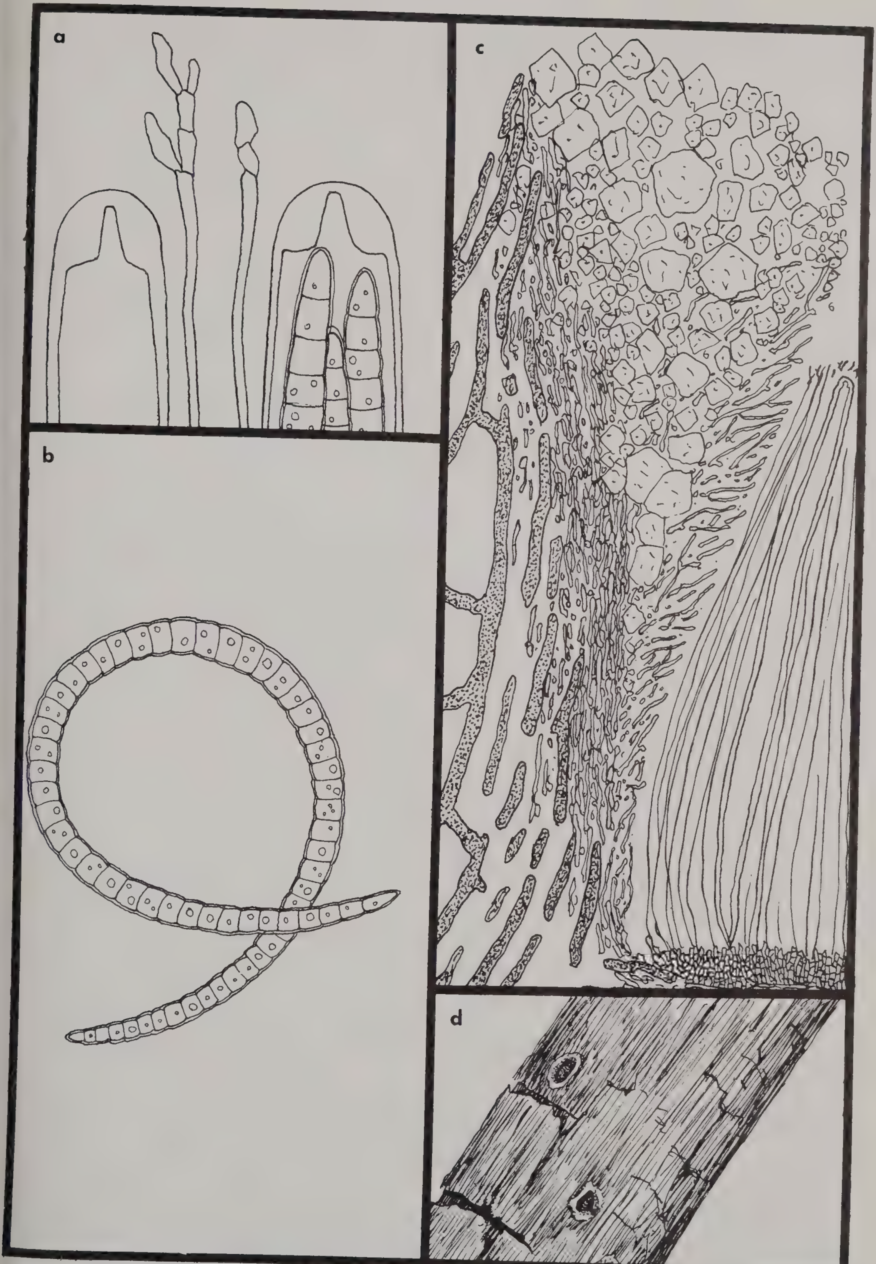

FIGURE 88. *Stictis pachyspora*. a. Detail of apices of asci, paraphyses, and spores, x1500. b. Ascospore, x750. c. Cross section of margin, x300. d. Habit sketch, x7.5. Drawn from B-Rehm Ascomyceten 420.

not seen. The black hairs mentioned by Ellis in the original description are conidiophores of a species of *Haplographium* which may or may not be associated with the *Hyaloscypha*.

On *Diatrype*, New Jersey. Known only from a poorly-preserved type collection. The species seems to be distinct from *H. dematiicola*.

SPECIMENS EXAMINED: NORTH AMERICA: USA (NY, Ellis, on *Diatrype*, New Jersey, holotype of *S. parasitica*)(CUP-D 7646, isotype)

(173). (STICTIS PATELLEA) Cke.
= *Cryptodiscus pallidus* (Pers.) Corda, q.v.

(174). (STICTIS PELVICULA) Pers., Myc. Eur. 1: 337 (1822)
≡ *Cryptodiscus pelviculus* (Pers.) Rehm in Rabenh., Krypt.-Fl. ed. 2, 1(3): 160 (1888)

Four specimens labelled *S. pelvicula* are deposited in Persoon's herbarium. One of these (910.263-936) is *Propolomyces farinosus*; it is annotated in handwriting other than Persoon's. The elongate frutibodies do not agree with the protologue of *S. pelvicula*, which described the fungus as having orbicular fruitbodies. The remaining three specimens are sterile and unidentifiable. #910.264-855 is annotated *Stictis pelvicula* in Persoon's handwriting and bears the additional label "*Stictis salicina* Ell ne resemble pas beaucoup a votre figure, un ais jene l cais ou la placer ailleurs Chaillet"; it may represent type material, since the species was described as ocurring on *Salix*.

SPECIMENS EXAMINED (see also text, above): EUROPE: sine loc. (L, Persoon 910.264-866; 910.264-856)

(175). (STICTIS PHACIDIOIDES) Fr., Syst. Mycol. 2(1): 198 (1822)
≡ *Propolis phacidioides* (Fr.) Corda, Icones Fungorum 2: 38 (1838)

S. phacidioides is a member of the Phacidiales and the type species of *Propolis*. For a discussion and additional synonyms, see Sherwood (1977).

(176). (STICTIS PHACIDIOIDES) (Desm.) Fr., Acta R. Soc. Sci. Upsal. ser. 3, 1: 123 (1851), non *S. phacidioides* Fr. (1822)
≡ *Cryptodiscus phacidioides* Desm., Ann. Sci. Nat. Bot. sér. 3, 3: 369 (1845)

I have seen no specimens of this species. The original description suggests that it may indeed be a *Cryptodiscus*.

(177). STICTIS PHILADELPHI Schw., Trans. Amer. Philos. Soc. n.s. 4: 180 (1832)

On *Philadelphus*, Bethlehem, Pennsylvania. The type specimen may be a species of *Stictis*, but there is no trace of hymenium left in it.

SPECIMEN EXAMINED: NORTH AMERICA: USA (PH, Schweinitz, Bethlehem, holotype of *Stictis philadelphi*)

(178). *STICTIS PHRAGMITIDIS* Lobik, Mater. Provid. Florist. Faunist. Investig. Terek reg. Pyatigorsk, 27 (1928)

I was unable to obtain a copy of this reference or to locate any specimens of *S. phragmitidis*.

(179). *(STICTIS PIMENTAE)* Seaver & Waterston, Mycologia 33: 313 (1941)
= *Propolis quadrifida* (Lév.) Mont.

For a discussion of this species, see Sherwood (1977).

(180). *STICTIS POLYCOCCA* (Karst.) Karst., Acta Soc. Fauna Flora Fennica 2(6): 166 (1885)
≡ *Schmitzomia polycocca* Karst., Fungi Fennici Exs. 768 (1868)
= *Schizoxylon aduncum* Feltg., Vorstud. Pilz-Fl. Luxembourg 1(3): 94 (1906)
≡ *Stictis adunca* (Feltg.) Höhn., Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Kl. Abt. 1, 115: 1260 (1906)

Figure 89

Apothecia gregarious, at first immersed, opening by a pore and becoming partially erumpent, 0.25-0.5 mm diam., the margin thick, stellately divided, occasionally somewhat annulate, dark grey pruinose, the disc deeply urceolate, brown. Margin 110 μm broad at the broadest point, lacking a prominent accessory thalline margin, the wall of loosely-interwoven non-carbonized brown hyphae 2.5-5 μm diam., these intergrading with an internal wall layer of colorless hyphae 2.0-3.0 μm diam., immersed in a gel. Periphysoids numerous, filiform, 20-25 x 1.5-2 μm, somewhat gelatinous, usually unbranched. A distinct crystalline layer is absent, but there are numerous small crystals imbedded in the wall. Subhymenium J-, of small colorless angular cells resting on a continuation of the brown wall layer. Paraphyses numerous, filiform, 0.8-1.0 μm thick, sometimes branched, not obviously circinate, J-. Asci 160-180 x 4.0 μm, the cap 3.0 μm thick, pierced by a narrow pore. Ascospores 8, 150-170 x 1.0-1.2 μm, septate, the cells 4-5 μm long.

On herbaceous debris, rarely on wood, Europe, Asia, and western North America. *Stictis pustulata,* a very similar species, has circinate paraphyses, smaller marginal cells, and narrower spores. The immature apothecium of *S. polycocca* is distinctive. The margin splits radially before its lobes become reflexed, and resembles a closed bud.

SPECIMENS EXAMINED: ASIA: West Pakistan (BPI 16561, on *Berberis*). EUROPE: Norway (O, on *Rubus*, Oct. 1840). Finland (FH, Fungi Fennici 768, on *Epilobium*, Wasa, isotype of *Schmitzomia polycocca*). Luxembourg (FH, on *Silene*, Feltgen IV.1901, holotype of *Schizoxylon aduncum*). Austria (FH-Höhnel, on *Urtica*, 24.6.1905; on *Atropa*, VI.1909; on *Salvia*, VII.1909; on *Digitalis*, 11.1909). NORTH AMERICA: Canada (TRTC 47473, on legume?, British Columbia)

(181). STICTIS PROMINENS Sherwood, spec. nov.

Figure 90

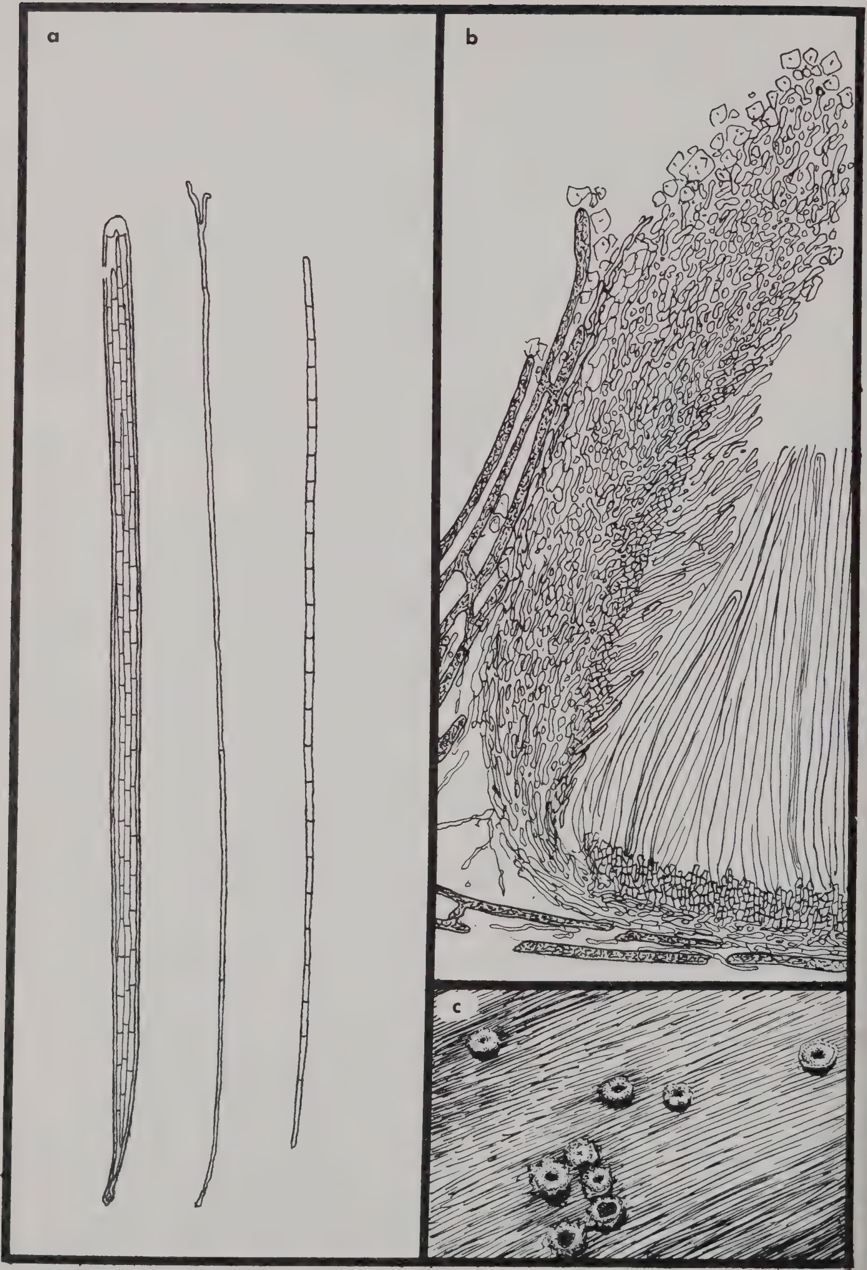

FIGURE 89. *Stictis polycocca.* a. Ascus, paraphysis, and spores, x750. b. Cross section of margin, x400. c. Habit sketch, x7.5. Drawn from FH-Höhnel, spec. on *Digitalis*.

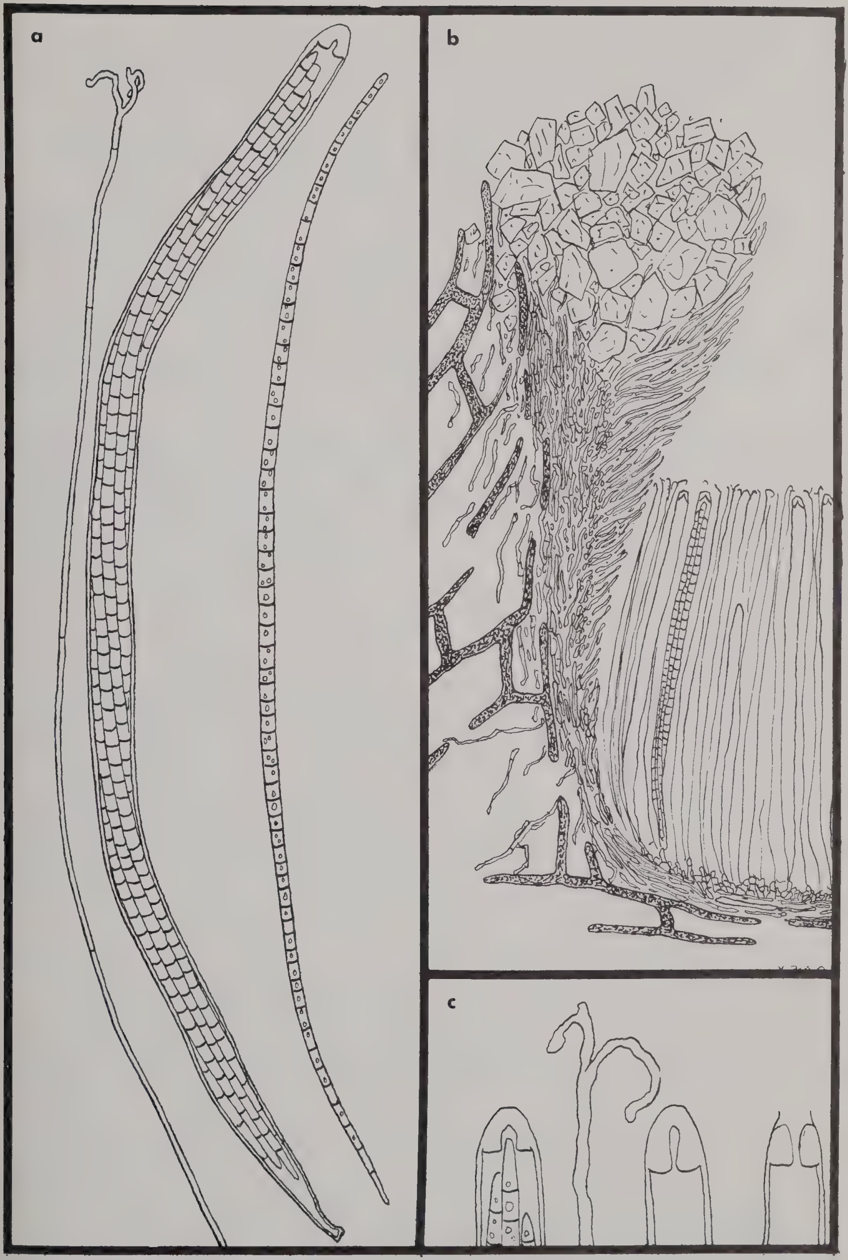

FIGURE 90. *Stictis prominens.* a. Ascus, paraphysis, and spores, x750. b. Cross section of margin, x225. c. Detail of apices of asci, paraphysis, and spores, x1500. Drawn from NY-Co 2006

Ascocarpi primum immersi, profunde cupulati, 0.8-1.0 mm diam., margine integro, albo, disco pallide ochraceo. Margo in sectione transversali 150 μm crassus, siccus ab hymenio se abrumpens, hypharum pariete 2.0 μm diam., achromo. Stratum crystallinum 50-75 μm crassum. Periphysoidea 50 x 1.5 μm, ramosa. Paraphyses filiformes, ramosae, circinatae, 250-300 x 1.0 μm, achromae, in iodo caerulescentes. Asci 220-300 x 6 (-8) μm, apice 5.0 m crassi, 8-spori. Sporae 220-300 x 2.0-2.25 μm, cellulis 3-4 μm longis.

HOLOTYPUS: COL [Dumont] 2006, on unidentified herbaceous stem, vicinity km 60 from Bogotá on the road between Guasca and Gacheta, Dpto. Cundinamarca. Dumont, Haines, Idrobo, 27.VII. 1974. ISOTYPUS: NY

Etymology: *Prominens* (prominent), because the apothecia are large and have a conspicuous thick margin.

Apothecia at first immersed, opening by a pore and at length becoming somewhat erumpent, with a prominent, white, entire, pruinose margin and deeply urceolate pale ochraceous disc, 0.8-1.0 mm diam. Margin in cross section 150 μm thick, the thalline margin more or less prominent, the wall 40 μm thick, of closely-packed, non-gelatinous, colorless hyphae 1.5 μm diam., the crystalline layer prominent, 50-75 μm thick. Periphysoids 50 x 1.0-1.5 μm, often branched, immersed in a gelatinous matrix, forming a compact layer. Subhymenium colorless, J-, of small angular cells resting on disintegrating host tissue. Paraphyses numerous, filiform, 1.0 μm broad, branched and circinate apically, J+ or J- (depending somewhat on age). Asci 220-300 x 6(-8) μm, the cap 5.0 μm thick, pierced by a narrow pore. Ascospores 8, 220-300 x 2.0-2.25 μm, not sheathed or coiling, septate, the cells 3-4 μm long.

On dead twigs, South America and Ceylon. Distinguished from *S. ramuligera* by the broader, more closely-septate spores, and from *S. radiata* by branched and circinate paraphyses and somewhat longer spores. This is one of the more easily disinguished members of the tropical *S. radiata* complex.

SPECIMENS EXAMINED (see also holotype, above): ASIA: Ceylon (CUP-SA-3280, Dumont, 15.I.1967; SA-3218, Dumont, 13.I.1967). SOUTH AMERICA: Ecuador (NY-Ec 2310, Prov. Pichincha, Dumont, Carpenter & Buriticá, 6.VIII.1975; Ec-1298, Prov. Tungurahua, Dumont, Carpenter & Buriticá, 24.VII.1975). Colombia (NY-Co 7707, Dumont et al., 1976). Venezuela (NY-Ve 6675, Dto. Federal, Dumont, Cain, Samuels & Manara; Ve-2413, Edo. Merida, Dumont, Haines, & Samuels)

(182). (STICTIS PROMINULA) Schw., Trans. Amer. Philos. Soc. n.s. 4: 180 (1832)
≡ *Propolis prominula* (Schw.) Thuem., Pilze Weinstockes 78 (1878)

Thuemen based his transfer to *Propolis* solely on Schweinitz's assignment of the species to *Stictis* subgen. *Propolis*. The type specimen consists of erumpent stromatic masses, pale brown in color, containing one or more convoluted locules lined with filamentous projections (conidia?

phialides?). This appears to be a coelomycete, but I am unable to place it.

SPECIMEN EXAMINED: NORTH AMERICA: USA (PH, on *Vitis*, Bethlehem, Pa., holotype of *Stictis prominula*)

(183). (STICTIS PSYCHOTRIAE) Mont.
≡ *Biostictis psychotriae* (Mont.) Sherwood, q.v.

(184). (STICTIS PTERIDINA) Phill. & Bucknall, Proc. Bristol Naturalist's Soc., new [3rd] ser. 3:   (1887)
≡ *Melittosporium pteridinum* (Phill. & Buckn.) Sacc., Sylloge Fung. 8: 705 (1889)

The type specimen contains two minute apothecia. According to Dennis (1968), the species is probably a *Cryptodiscus* rather than a *Melittosporium*, where it was placed by Saccardo on the grounds that it had muriform spores. In the absence of additional specimens I am unable to decide whether the species is a *Cryptodiscus*, *Propolidium*, or *Delpontia*. The external appearance of the fruitbody and the illustrations accompanying the type specimen would definitely exclude the species from *Melittosporium* and *Stictis*.

SPECIMEN EXAMINED: EUROPE: Great Britain (K, on *Pteris*, Bristol, Bucknall, holotype of *Stictis pteridina*)

(185). (STICTIS PUIGGARI) Speg., Bol. Acad. Nac. Ci. 23: 151 (1919)

The type is a lichen in poor condition. The spores are non-graphidean, and the hymenium, in the apothecia I examined, is J- (J+ according to Spegazzini). The thick margin consists of radiating hyphae immersed in a gelatinous matrix; there are no periphysoids. This seems to be a member of the Gyalectaceae.

SPECIMEN EXAMINED: SOUTH AMERICA: Brazil (LPS 28225, on Myrtaceae?, Apiahy, 34, holotype of *Stictis puiggari*)

(186). (STICTIS PUNCTIFORMIS) (Pers.) Phillips
≡ *Stictis pallida* Pers., q.v.

(187). (STICTIS PUPULA) Fr., Syst. Mycol. 2(1): 193 (1822)
≡ *Schmitzomia pupula* (Fr.) Fr., Summa Veg. Scand. sect. post. 364 (1849)

The application of the name *Stictis pupula* is ambiguous. In current publications (cfr. Nannfeldt, 1932) the name is treated as a synonym of *S. mollis*, an earlier name which must be rejected under the current International Code of Botanical Nomenclature if the two species are considered synonymous.

Fries's original description is ambiguous and he cites no specimen. His herbarium contains three specimens labelled *Schmitzomia pupula*. One, collected in 1861 and hence clearly not type material, is *Schizoxylon berkeleyanum*. The second contains flattened, greenish fruitbodies with a margin of crystalline material and an interior matrix of brown hyphae and globose green cells. It does not agree with the protologue, but may be what Fries (1828) referred to when he stated that *Agyrium atrovirens* was an abortive form of *Stictis pupula*. The third specimen contains two chips of wood. One bears apothecia of a *Stictis* with a colorless margin, and cannot be *S. pupula* in the current sense. The other bears *Schizoxylon berkeleyanum*. Fries (1828) synonymized *Stictis mollis*, a species with a dark margin unrepresented in the Fries herbarium, and *Sphaeria venusta* Sommerf. (an unpublished name represented in Sommerfelt's herbarium by a specimen of *Schizoxylon albo-atrum*) with *Stictis pupula*. I am unable to extract a suitable type specimen from this mixed protologue, and propose that the name be abandoned.

(188). (STICTIS PUSILLA) Lib. ex Speg. & Roum., Rev. Mycol. (Toulouse) 2: 20 (1880), pro synon.
≡ *Trochila pusilla* (Lib. ex Speg. & Roum.) Speg. & Roum., l.c.
≡ *Peziza perpusilla* Cooke, Grevillea 8: 85 (1880)
≡ *Naevia pusilla* (Lib. ex Speg. & Roum.) Rehm in Rabenh. Krypt.-Fl. ed. 2, 1(3): 143 (1888)
≡ *Hysteropezizella pusilla* (Lib. ex Speg. & Roum.) Nannf., Nova Acta Regiae Soc. Sci. Univ. Upsal. IV, 8(2): 120 (1932)

The combination *Stictis pusilla* Lib. is not validly published. The species, an immersed member of the Dermateaceae, is discussed (as *Hysteropezizella*) by Défago (1967).

(189). STICTIS PUSILLA Speg., Bol. Acad. Nac. Ci. 11: 277 (1887)

Figure 91

Apothecia minute, immersed, not becoming erumpent, 0.25 - 0.35 (-0.5, fide Spegazzini, l.c.) mm diam., the margin white-pruinose, entire, not prominent, the disc deeply urceolate, pale ochraceous. Margin 10-20 μm thick, of slender colorless hyphae 1.5 μm diam., not sharply differentiated into layers, the periphysoids scant. Subhymenium J-, of small, colorless angular cells resting directly of host tissue. Paraphyses numerous, filiform, J-, 1.0 μm broad below, abrubtly enlarged to 2.0 μm at the knoblike tip. Asci 80-95 x 5-6 μm, the cap 1.5 μm thick. Spores 80-100 x 1.0-1.5 μm, obscurely sheathed, somewhat coiled within the ascus, not septate in the type specimen.

On grasses, Tierra del Fuego, and possibly in England. Small size and knoblike paraphyses distinguish this species, which is quite different from *S graminicola* or *S. stellata*. The British specimen is indistinguishable from the type.

SPECIMENS EXAMINED: SOUTH AMERICA: Argentina (LPS, on *Rostkovia*, Isla de los Estados, Spegazzini, holotype of *S. pusilla*). EUROPE: Great Britain (K, on *Carex*, Sussex, Dennis 16.I.1971)

(190). STICTIS PUSTULATA Ellis, Bull. Torrey Bot. Club 8: 65 (1881)
= *Stictis helicotricha* Ell. & Everh., Proc. Acad. Philadelphia 1893: 151 (1894)

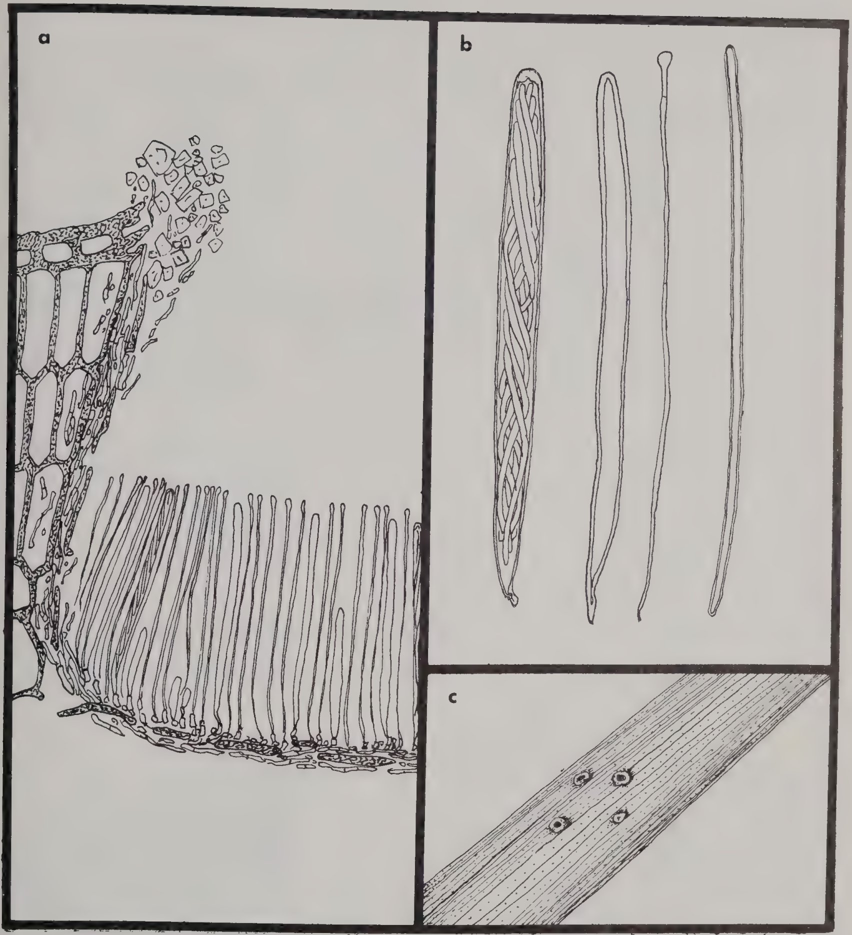

FIGURE 91. *Stictis pusilla*. a. Cross section of margin, x300. b. Asci, paraphysis, and spores, x750. c. Habit sketch, x7.5. Drawn from the holotype.

= *Stictis vincae* Ellis in Seymour, Host Index 571 (1929) (nom. nud.)

Figure 92

Apothecia at first immersed, becoming somewhat erumpent, 0.25-0.5 mm broad, the margin thick, entire, brown, scarcely pruinose, the disc deeply urceolate, brown. Margin in cross section 150 µm thick, the outermost layer stromatic, consisting of 6-8 rows of interwoven dark brown carbonized hyphae 2.0-2.5 µm diam, surrounding a wall of small, colorless, pseudoparenchymatous cells. Periphysoids 35-50 x 0.5-0.8 µm, unbranched, not gelatinous, forming a compact layer. A few small crystals are produced near the summit of the

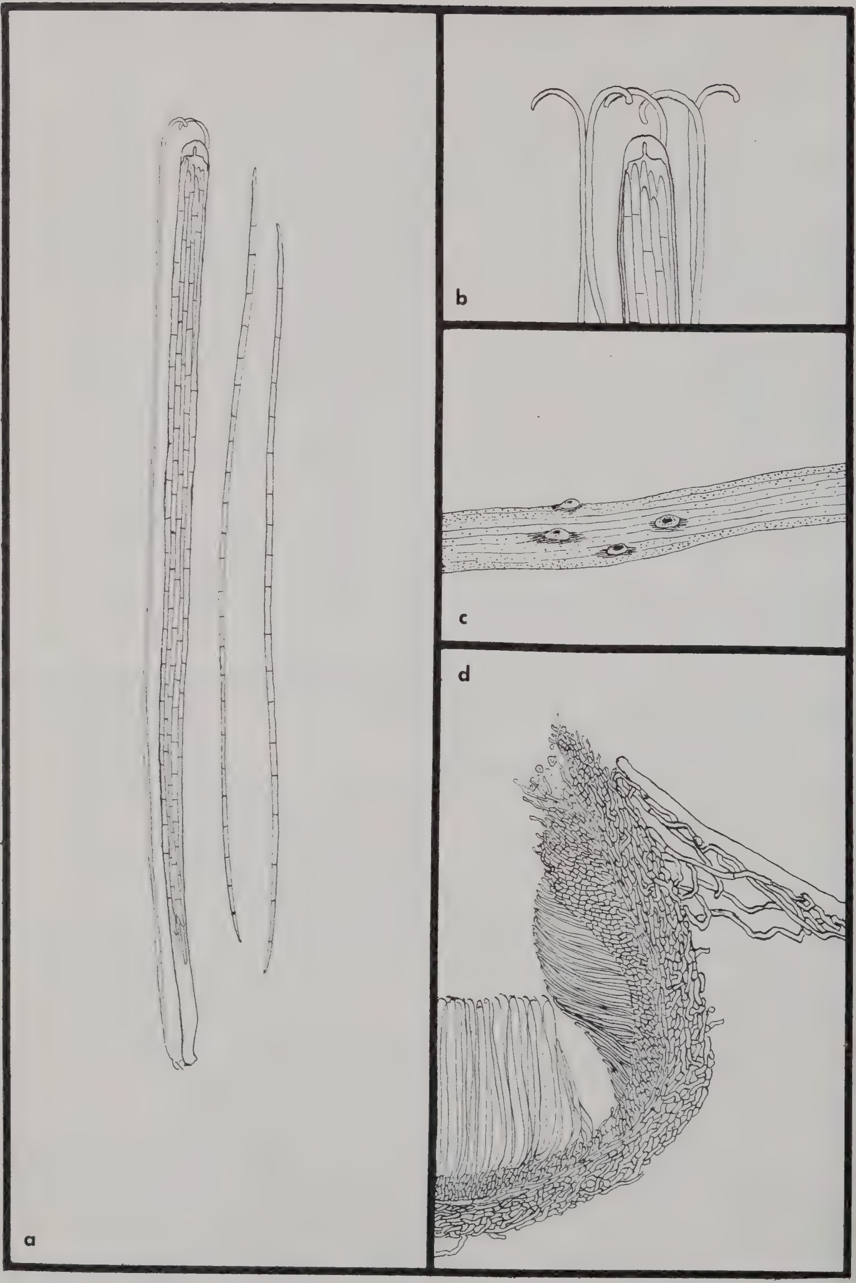

FIGURE 92. *Stictis pustulata*. a. Ascus, paraphyses, and spores, x750. b. Detail of apices of an ascus, paraphyses, and spores, x1500. c. Habit sketch, x7.5. d. Cross section of margin, x225. Drawn from CUP-D-7653.

margin, but there is no definite crystalline layer. Subhymenium of small, colorless, angular cells resting on brown fungus stroma. Paraphyses numerous, filiform, 0.5-0.8 µm broad, simple, circinate, J-. Asci 160-180 x 3.0-3.5 µm, the cap 2.5 µm thick. Spores 8, 0.8-1.0 x 160-175 µm, septate, the cells 4-5 µm long.

On herbaceous stems and small twigs, Europe and North America. *S. pustulata* is rare in Europe but fairly common in eastern North America. *S. polycocca* is very similar, and sections are necessary to distinguish the two species.

SPECIMENS EXAMINED: EUROPE: Hungary (BP, on *Ruta,* Tóth 14.IV.1956). NORTH AMERICA: USA (CUP-D-7707, on *Vinca*, Ohio, Kellerman 207, *Stictis vincae* ex herb. Ellis; D-2000, on *Arundinaria,* Mississippi, Tracy 15.IV. 1990, isotype of *S. helicotricha;* D-7653, on *Trifolium,* New Jersey, Ellis, 1881, isotype of *S. pustulata*). Canada (TRTC 9850, 3305, 8493, all on *Ribes,* Ontario*)*

(191). (STICTIS QUADRIFIDA) Lév., Ann. Sci. Nat. Bot. sér. 3, 5: 255 (1846)

≡ *Propolis quadrifida* (Lév.) Mont. in Gay, Fl. Chile 7: 425 (1852)

For a discussion of this species, a member of the Phacidiales, see Sherwood (1977).

(192). STICTIS QUADRINUCLEATA Sherwood, spec. nov.

Figure 93

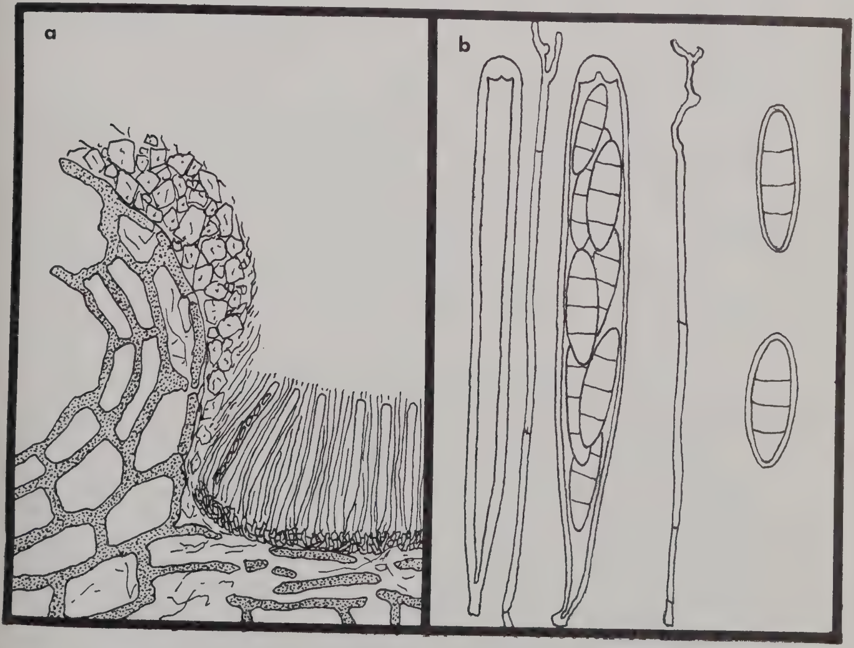

FIGURE 93. *Stictis quadrinucleata.* a. Cross section of margin, x375. b. Asci, paraphyses, and spores, x1500. Drawn from the holotype.

Ascocarpi primum immersi, profunde cupulati, 0.2-0.5 mm diam., margine lacerato, albo, disco pallide ochraceo. Margo in sectione transversali 50 μm crassus, siccus ab hymenio se abrumpens, hypharum pariete 1.5 μm diam., achromo. Stratum crystallinum 50 μm crassum. Periphysoidea 8-10 x 1.0 μm, non ramosa. Paraphyses filiformes, ramosae, 55 x 1.0 μm, in iodo non caerulescentes. Asci 50-55 x 4(-6) μm, apice 2 μm crassi, 8-spori. Sporae 10-13 x 2.5-3.5 μm, vagina gelatinosa involutae, cellulis 2.5-3 μm longis.

HOLOTYPUS: NY-Ve 1916, On unidentified fern, ca. 6 km above Maracay on the Maracay-Choroni road, Parc. Nac. Henry Pittier, Edo. Aragua. K. P. Dumont, J. Haines & G. Samuels, 12 July 1971, Venezuela.

Etymology: The epithet refers to the 4-celled spores.

Apothecia at first immersed, opening by a pore but not becoming erumpent, 0.2-0.5 mm diam., the margin white-pruinose, lacerate, the disc moderately deeply immersed, pale ochraceous. Margin in cross section 50 μm thick, predominantly crystalline, the wall hyphae colorless, 1.5 μm diam; Periphysoids few, unbranched, 8-10 x 1.0 μm. Subhymenium 5 μm thick, of colorless angular cells resting directly on disintegrating host tissue. Paraphyses numerous, filiform, 1.0 μm broad, branched and propoloid at the apex, J-. Asci 50-55 x 4(-6) μm, the cap 2 μm thick. Ascospores 8, irregularly biseriate, sheathed, 10-13 x 2.5-3.5 μm, 3-septate.

On fern stalks, Venezuela. The species is intermediate between *Stictis* and *Propolidium*. Its external aspect is that of a small *Stictis*.

SPECIMENS EXAMINED: See holotype, above.

(193). *(STICTIS QUERCIFOLIA)* Cooke, Grevillea 5: 50 (1876)
≡ *Propolis quercifolia* (Cooke) Sherwood, Mycotaxon 5: 327 (1977)

A discussion of this species, which is a member of the Phacidiales, appears in Sherwood (1977).

(194). *(STICTIS QUERCINA)* Peck., Annual Rep. New York State Mus. 28: 69 (1879)
= *Stictis quercifolia* Cooke, q.v.

(195a). *STICTIS RADIATA* Pers., Obs. Mycol. 2: 73 (1799) subsp. *RADIATA*
≡ *Schmitzomia radiata* (Pers.) Fr., Summa Veg. Scand. sect. post. 364 (1849)
≡ *Peziza aecidioides* Nees, Syst. 2: 66 (1817)
≡ *Stictis aecidioides* (Nees) S.F. Gray, Nat. Arr. Brit. Pl. 1: 663 (1821)
= *Lichen excavatus* Hoffm., Enum. Lich. 47 (1784), n.v.
= *Sphaerobolus rosaceus* Tode, F. Meckl. 1: 44 (1790)
  ≡ *Schmitzomia rosacea* (Tode) Fr., Summa Veg. Scand. sect. post. 364 (1849)
= *Sphaerobolus corii* Schw., Trans. Amer. Philos. Soc. n.s. 4: 254 (1832)

≡ *Stictis corii* (Schw.) Sacc., Sylloge Fung. 8: 695 (1889)

= *Stictis hyssopi* Schw., l.c. p. 180

= *Stictis umbellatarum* Schw., l.c. p. 179

= *Schmitzomia carestiae* de Not., Comment. Soc. Crittog. Ital. 1: 362 (1864)

≡ *Schmitzomia radiata* (Pers.) Fr. var. *carestiae* (de Not.) Rehm, Ascomyceten 23 (1870)

≡ *Stictis carestiae* (de Not.) Winter in Kunze, Fungi Sel. Exs.Fungi Helvetici 67 (1880)

= *Stictis annulata* Cooke & Phillips, Grevillea 9: 8 (1880)

= *Stictis thelotremoides* Phill. in Kalchbr., Grevillea 11: 25 (1883)

= *Stictis bromeliae* Starbäck, Bih. Kongl. Svenska Vetensk. Akad. Handl. 25(14): 15 (1889)

= *Stictis bambusella* Höhn., Denschr. Kaiserl. Akad. Wiss., Math.-Naturwiss Kl. 83, extra: 30 (1907)

= *Stictis musae* Seaver & Waterston, Mycologia 33: 313 (1941)

= *Stictis filicicola* Seaver & Waterston, *ibid.*: 315

= *Stictis bengalensis* Singh & Pavgi, Sydowia 19: 244 (1965)

Figure 94

Apothecia at first immersed, opening broadly by a pore but not becoming erumpent, 0.4-1.0(-1.2) mm broad, the margin thick, white-pruinose, entire to more commonly lacerate, the disc deeply immersed, pale ochraceous. Margin in cross section 80-120 µm thick, 3-layered, with a poorly-differentiated accessory thalline margin, the wall of colorless interwoven hyphae 1.5 µm diam., not notably gelatinous, rarely turning reddish in iodine solutions, the crystalline layer prominent, of large, non-rosettiform crystals; periphysoids 15-30 x 1.0-1.5 µm, not markedly gelatinous, branched. Subhymenium c. 15 µm thick, of small, angular, colorless cells resting on disintegrating host tissue, J+ blue, at least when old. Paraphyses numerous, filiform, 1.0 µm thick below, enlarged to 1.5-2.0 µm above, somewhat irregularly branched, J+ (rarely J-), colorless. Asci 120-250 x 5.5-6(-8) µm, the cap 3.5 µm thick, pierced by a narrow pore. Ascospores 8, nearly as long as the asci, 2.0-2.5 µm broad, not sheathed or coiling, septate, the cells 4-6 µm long.

On bark, decorticated wood, herbaceous stems, and even conifer needles and old leather, throughout the humid parts of the world. This species accounts for more than half of the collections from temperate areas; it is somewhat less common in the tropics. The host range includes Pteridophytes, Gymnosperms, Monocots, and Dicots. *S. radiata* intergrades with *S. stellata* and *S. carnea*. *S. stellata* generally has a hymenium which does not blue in iodine, narrower spores, broader periphysoids, and an herbicolous habit. Ultimately, only broader, unbranched periphysoids are reliable for separating these two species, since *S. radiata* may be entirely J-. The spores of *S. carnea* are broader and more closely septate, so that many cells are as broad as long, a character not found in *S. radiata.*

With the exceptions noted below, all of the synonyms cited above are based on type specimens which I examined and found to be typical *S. radiata.*

I have not seen the type specimen of *Lycoperdon radiatum* L. For reasons explained under discussion of typification of *Stictis*, above, I am excluding the species from the synonymy. *Lichen excavatus* is taken from Persoon's synonymy. No original material remains of *Sphaerobolus rosaceus.* Tode's illustration shows the hymenium being ejected as a unit; the picture otherwise looks like a *Stictis.* The single specimen of *Schmitzomia rosacea* in Fries's herbarium is too fragmentary to determine with certainty, but may well be *Stictis radiata.* The specimen of *Stictis hyssopii* which I examined was likewise overmature and undeterminable.

Nees's name *Peziza aecidioides* was an avowed substitute for *S. radiata,* the epithet *radiata* being preoccupied in *Peziza.* The name *Stictis carestiae* is commonly applied to specimens on conifers with small (0.5 mm) apothecia, rather short (130-180 µm) asci, and an intensely J+ hymenium. *Stictis radiata* was originally described from *Pinus*, and the lectotype in Persoon's herbarium corresponds exactly to *S. carestiae.* If a varietal name is needed, it is for larger specimens on angiosperms.

Although at least two species *(S. ostropoides* and *S. chrysopsis)* having an annulate margin occur on *Lonicera* in the western US, all of the original material of *S. annulata* in Cooke's herbarium, as well as additional non-type collections in the Durand herbarium (CUP) are *S. radiata.* The type specimen of *S. thelotremoides,* growing underneath a disintegrating lichen thallus, lacks spores but otherwise seems to be *S. radiata. S. bambusella* is represented in the type collection by a single apothecium. A slide in von Höhnel's collection suggests that this is *S. radiata,* although I have seen no example of that species in which the hymenium turns wine-red in iodine, as was alleged by von Höhnel for *S. bambusella.*

SPECIMENS EXAMINED: EUROPE: Sweden (UPS, Småland, Femsjö, herb. Fries; Femsjö, Fries, labelled *Schmitzomia rosacea*; Uppsala, on *Salix,* Fries 18.X.1856)(S, on *Quercus,* Graversfors, Haglund 19.IX.1899; Vestergren, 18.I.1911, Gotland; on *Berberis,* Upsala 20.VIII.1895, Eliasson; on *Corylus,* 12.IV.1954, Nannfeldt & Woldmar; on *Fagus,* Nannfeldt 16.IV. 1946). France (ZT, on *Quercus,* Müller 18.IV.1959)(Herb. Korf, on *Lonicera,* Corsica, 14.X.1972, Korf & Demoulin). Germany (L, Persoon 910.263-968, in cortice *Pini abietis,* lectotype, designated here, of *Stictis radiata*; Persoon 910.263-965). Italy (FH-Rabenhorst, F. Eur. 775, Riva, 1863, in ramis *Abietis excelsa* leg. Carestia, isotype of *Schmitzomia carestiae*). Great Britain (NY, on *Lonicera,* Lyndhurst, Massee) (K, on *Lonicera,* ex herb. Phillips, labelled *S. annulata*). AFRICA AND ATLANTIC ISLANDS: Tristan da Cunha (K, on *Phylica,* Meyland 1693, 7.II. 1938). Canary Islands (CUP-MM 10, 44, 48, 60, 71, 102, 131, 204, 205, 206, all Tenerife, Korf, Denison, Kohn & Sherwood, Jan. 1976). Union of South Africa (K, nr. 76 ex herb. Phillips, holotype of *Stictis thelotremoides*). ASIA: Japan (CUP-JA 2942, Honshu, 25.II.1966, Korf, Dumont, Tubaki & Aoshima). Java (FH-Höhnel, Tijbodas, 1907-1908; Höhnel 4653, Buitenzorg, 1907-1908). India (K, on *Eupatorium,* Darjeeling, 23.XI.1964,

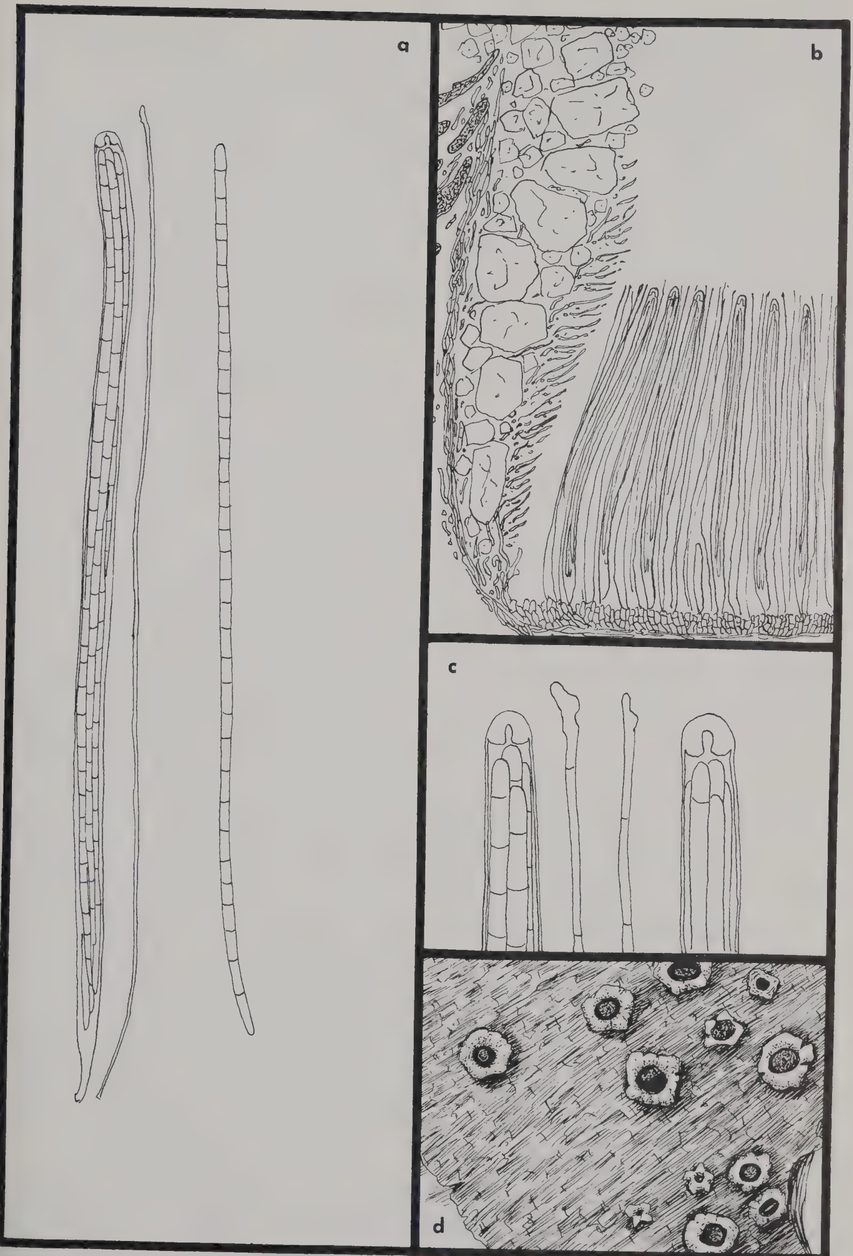

FIGURE 94. *Stictis radiata*. a. Ascus, paraphysis, and spores, x750. b. Cross section of margin, x225. c. Detail of apices of asci, paraphyses, and spores, x1500. d. Habit sketch, x7.5. Drawn from CUP-California Fungi 1110.

isotype of *S, bengalensis*). West Pakistan (BPI 4771, 20.VII,1972, S. Ahmad). NORTH AMERICA: USA (CUP-D-7675, on *Salix,* California, Harkness; Fairman, on *Spiraea,* California, Nuttall 8.II.1920; California Fungi 1110, on *Arbutus*; D-3906, Bethlehem Pennsylvania, isotype of *Stictis umbellatarum* ex herb. Schweinitz)(K, Harkness 1310, on *Lonicera,* lectotype, designated here, of *Stictis annulata*, California; Harkness 1213, California, lectoparatype)(UC [all Parks herbarium, Humboldt & Del Norte cos., California] 6498, on *Rubus;* 6148, on *Acer;* 6812, on *Umbellularia;* 6319, on *Physocarpus;* 4136, on *Pteridium;* 5306, on *Ceanothus;* 6795, on *Lonicera;* 6203, on *Rhododendron;* 5352, on *Garrya;* 5434, on *Sequoia;* 3575, on *Salix;* 5436, on *Gaultheria;* 6880, on *Ribes;* 5496, on *Erechtites;* 3540, on *Baccharis;* 4156, on *Rhamnus;* 6397, on *Alnus;* 6252, on *Corylus;* 4207, on *Pyrus*)(OSC 6363, on *Rhus,* Oregon)(Herb. Korf, on needles of *Pseudotsuga*, 13.VIII.1975; on *Picea,* 17.VIII.1975)(NY, on *Maclura,* Ohio, Fink 18.V.1915)(PH, Schweinitz, on corium (leather), Bethelehem, Pennsylvania, holotype of *Sphaerobolus corii;* Schweinitz, Bethlehem, Pennsylvania, holotype of *Stictis hyssopii*). Mexico (NY, Murrill, Orizaba, Jan 10-14, 1910; Tepeite, Murrill 525, 28.XII.1909). Canada (NY, Newfoundland, Waghorn 129). Bermuda (CUP 34639, on *Musa,* Seaver & Whetzel 76, isotype of *Stictis musae;* 32626, on *Agave,* Seaver & Whetzel)(NY-Bermuda 1322, Brown, Britton & Seaver, on *Acrostichum,* holotype of *S. filicicola*). Jamaica (K-Farr 243, Flora of Jamaica F-885) Panama (NY-Pa 1635, Prov. Chiriqui, Dumont &Carpenter, 2.VII.1975). SOUTH AMERICA: Ecuador (NY-Ec 1808, Prov. Zamora, Dumont, Capenter, Buriticá, 31.VII.1975; Ec-1970, *ibid.*, I.VIII.1975; Ec-237, Prov. Pichincha, *ibid.*, 17.VII.1975; Ec-538, *ibid.*, 19.VII.1975; Ec-181, *ibid.*, 17.VII.1975; Ec-1409, Prov. Tungurahua-Pastaza, *ibid.*, 24.VII.1975; Ec-1372, *ibid.*).)Colombia (Ny-Co 770, Dto. Antioquia, Dumont, Haines, Velasquez, Fonegra, 6.VII.1974; Co-1074, Dto. Valle, Dumont, Haines, Velasquez, Idrobo, 16.VII.1974; Co-4942; 6153; 6372; 6384; 6427; 6481; 6486; 6790; 6792; 6848; 6954; 6962; 7042; 7210; 8172; 6068; 5373; 5364; 5331 [all Dumont et. al., 1976]). Peru (NY-Pe 436; 472; 102; 305; 352; 438; 385 [all Dumont et al., 1976]). Venezuela (NY-Ve 103, Dto. Federal, Dumont, Haines, Manara, 18.VI.1971; Ve-3713, Edo. Miranda, Dumont, Samuels, Manara, 29.VII.1972; Ve-3775, Edo. Miranda, Dumont, Samuels, Manara, 1.VII.1972; Ve-3449, Edo. Merida, Dumont & Samuels, 30.VII.1971; Ve-1812, Dumont, Samuels, Haines, Leal, 10.VII.1971; Ve-1501, Edo. Aragua, Dumont, Haines & Samuels, 6.VII.1971; Ve-3848, Edo. Miranda, Dumont, Samuels, Manara, 30.VI.1972; Ve-3252, Edo. Tachira, Dumont, Samuels, Borjas, 28.VII.1971).Chile (NY, Juan Fernandez Isl., Masatierra, Skotsberg 30.X.1916). Brazil (S, Malme 264, 18.III.1893, Rio Grande do Sul, holotype of *Stictis bromeliae*)(FH, Höhnel 4653, in culmis Bambusae, São Paulo, holotype of *S. bambusella*).

(195b). STICTIS RADIATA Pers. subsp. *INTERMEDIA* (Speg.) Sacc., Sylloge Fung. 8: 682 (1889)

≡ *Stictis intermedia* Speg., Anal. Soc. Cientif. Argentina Buenos Aires 10: 226 (1880)

= *Stictis tropicalis* Speg., Ann. Mus. Buenos Aires 29: 455 (1909)

Stictis radiata subsp. *intermedia*, originally described as being intermediate between *S. stellata* and *S. radiata,* is characterized by short, unbranched periphysoids 2.0 μm broad, an intensely J+ hymenium, and ascospores 2.5-3 μm broad, with cells 2.5-5 μm long, not tapering basally.

SPECIMENS EXAMINED: NORTH AMERICA: Panama (NY-Pa 769, Prov. Veraguas, Dumont, SE&SM Carpenter, Mori, 19.VI.1975). SOUTH AMERICA: Ecuador (NY-Ec 1814, Prov. Zamora, Dumont, Carpenter, Buriticá, 31.VII.1975; Ec-1339, Prov. Tungurahua, *ibid.*, 24.VII.1975). Venezuela (NY-Ve 2898, Edo. Merida, Dumont, Samuels, Borjas, 24.VII.1971; 2390, on *Piper*, Edo. Merida, Dumont, Haines, Samuels, 19.VII.1971; Ve-5879, on *Inga*, Dto. Federal, Dumont, Cain, Samuels, Manara, 24.VII.1972; Ve-1691, Edo. Lara, Dumont, Haines, Samuels, Leal, 9.VII.1971; Ve-4122, Edo. Sucre, Dumont, Cain, Samuels, Morillo). Peru (NY-Pe 86; 42; 242 [all Prov. Junin, Dumont et al. 1976]). Colombia (NY-Co 6224; 6326; 6448; 6451 [all Dto. Antioquia, Dumont et.al., 1976]; Co-5414; 5423 [both Dto. Cundinamarca, Dumont et al., 1976]; 4554, Boyacá, Dumont et al., 1976;Co-515, Dumont et al., Dto. Cundinamarca). Argentina (LPS, on *Conium*, Bañado de San José de Flores, holotype of *Stictis intermedia;* 28230, on *Musa*, Orán, II-1905, holotype of *S. tropicalis*). AFRICA: Uganda (K, 4170, June 19). ASIA. Borneo (CUP-SA 2577, North Borneo, Dumont 15.XII.1966). Philippines (S, on *Daemonorops?*, Dr. Copeland, Los Baños 7/1913, as *S. stellata* f. *philippinensis* Rehm)

(196). STICTIS RAMULIGERA Starbäck, Bih. Kongl. Svenska Vetensk. Handl. 25(14): 15 (1899)

Figure 95

Apothecia at first immersed, opening by a broad pore but not becoming erumpent, 0.5-0.8 mm diam., the margin thick, white-pruinose, entire, the disc moderately deeply urceolate, pale ochraceous. Margin in cross section 75-85 µm thick, the wall 40 µm thick, of colorless, angular, more or less pseudoparenchymatous cells 1.5-2 µm diam., the periphysoids 30 x 2.0 µm, unbranched, non-gelatinous, the crystalline layer prominent. Subhymenium c. 10 µm thick, resting on disintegrating host tissue, J-. Paraphyses numerous, filiform, not enlarged above, colorless, 1.0-1.5 µm diam., branched and circinate apically, J+. Asci 180-220 x 1.5-1.75 µm, the cells 5-8 µm long.

On herbaceous stems, South America. *Stictis hydrangeae*, the only other species with circinate paraphyses, a colorless margin, and narrow, distantly-septate spores, has branched periphysoids and a gelatinous margin.

SPECIMENS EXAMINED: SOUTH AMERICA: Brazil (FH, Vestergren, Microm. Sel. Exs. 843, Rio Grande Do Sul, 24.I & 10.II 1893, isotype of *Stictis ramuligera*). Venezuela (NY-Ve 3108, Edo. Barinas, Dumont, Samuels, Borjas, 26.VII.1971). Colombia (NY-Co 1693, Dto. Antioquia, Dumont, Haines, Velasquez, 20.VII.1974; Co-6844, Norte de Santander, Dumont, Sherwood, Velasquez, 20.VIII.1976; Co-6844, Cundinamarca, Dumont et al.)

(197). (STICTIS RHODOLEUCA) Sommerfelt, Fl. Lapp. 198 (1826)
≡ *Propolis rhodoleuca* (Sommerf.) Fr., Summa Veg. Scand. sect. post. 372 (1849)
= *Stictis fulva* Peck, Bot. Gax. (Crawfordsville) 6: 36 (1880)

The species is a typical *Propolomyces*, distinguished from *P. farinosa* by having equilateral, slightly thick-walled spores 7-8 x 18-19 µm. The spores of *Propolis leonis*, which also occurs on pine cones, are much larger.

SPECIMENS EXAMINED: EUROPE: Norway (O, Saltd., in squamis strobili pini 3/1823, labelled lectotype of *Stictis rhodoleuca* by M. Jørgensen).

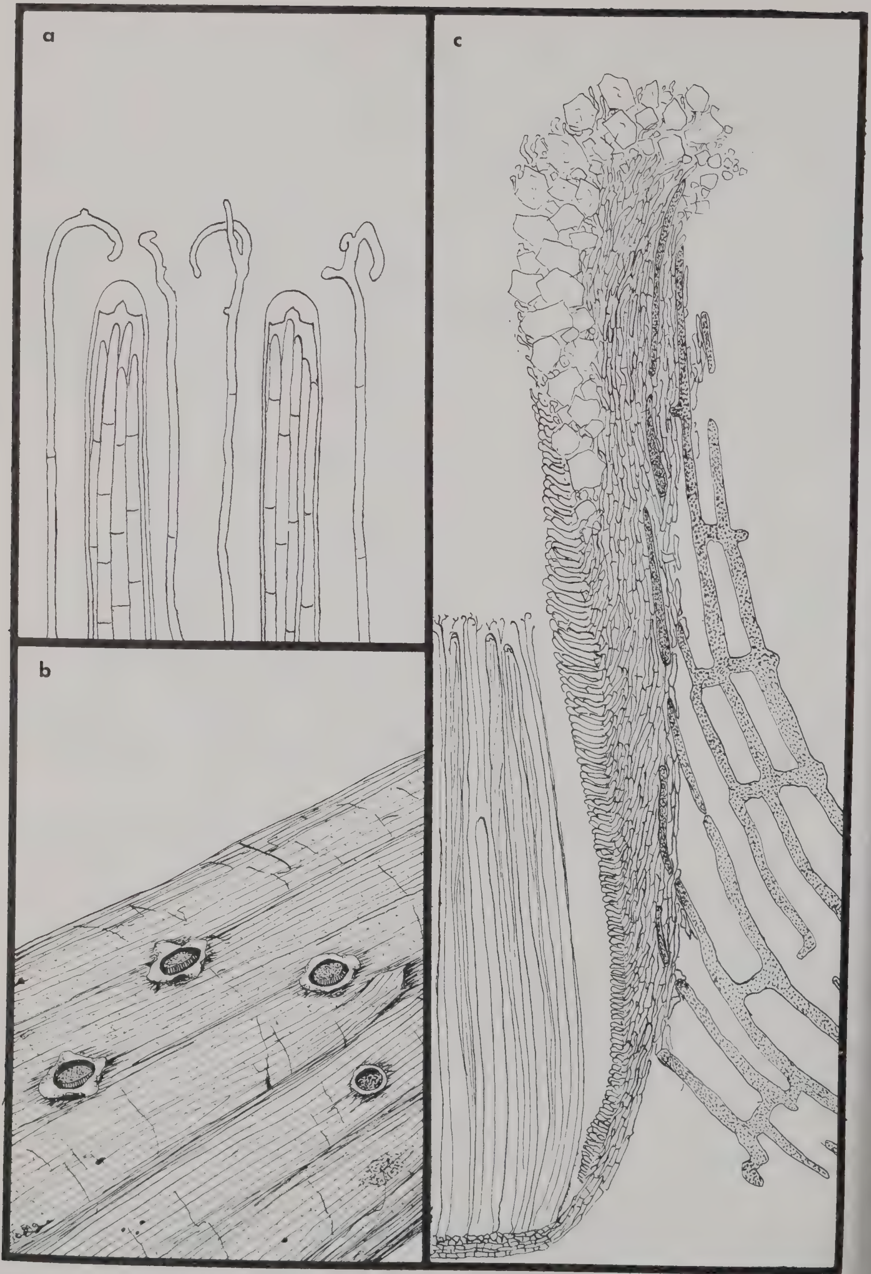

FIGURE 95. *Stictis ramuligera*. a. Detail of apices of asci, paraphyses, and spores, x1500. b. Habit sketch, x7.5. c. Cross section of margin, x300. Drawn from FH-Vestergren 843.

NORTH AMERICA: USA (CUP-D 9035, Vermont, Pringle 420, isotype of *Stictis fulva*)

(198). *STICTIS RUBI* Schw., Trans. Amer. Philos. Soc. n.s. 4: 179 (1832)

The holotype seems to have been a species of *Stictis*, but is too immature to characterize.

SPECIMEN EXAMINED: NORTH AMERICA: USA (CUP-D 3903, isotype of *Stictis rubi* ex herb. Schweinitz)(PH, Bethlehem, holotype of *S. rubi*)

(199). *(STICTIS RUBI)* Crouan & Crouan, Fl. Finist. 42 (1867), non *S. rubi* Schw. (1832)

The type specimen could not be borrowed for examination. The species is probably not a *Stictis* and may be a *Cryptodiscus*, but the original description will not serve to characterize it.

(200). *(STICTIS RUBIACEARUM)* Pat.
= *Biostictis psychotriae* (Mont.) Sherwood, q.v.

(201). *(STICTIS RUBICUNDA)* Dur. & Lév., Expl. Sci. Alg. Atlas pl. 29, f. 6 (1850)

I received no answer to inquiries for this species addressed to PC, and it is unrepresented at FH. The original illustration shows a species with elongate black hysterothecia with an accessory red margin. It is unlikely that this is a *Stictis* in the present sense. It may be Hysterialean.

(202). *(STICTIS RUFA)* Pers., Obs. Mycol. 2: 74 (1799)
≡ *Agyrium rufum* (Pers.) Fr., Syst. Mycol. 2(1): 252 (1822)

For a discussion of the affinities of *Agyrium*, see the list of genera, above. I have designated 910.264-857 as the neotype (it cannot be the holotype, which occurred on *Taxus*) since this specimen confirms to current usage of the name and contains asci. The other specimen in Persoon's herbarium may well be correctly identified, but contains no asci.

SPECIMENS EXAMINED: EUROPE: France? (L, 910.264-857, on sapin (*Abies*), neotype, designated here, of *Stictis rufa*) Germany (L, Persoon 910.264-846, sine loc.)

(203). *STICTIS SACCARDOI* Rehm
= *Stictis stellata* Wallr., q.v.

(204). *(STICTIS SALIGNA)* (Albertini & Schw.) Pers., Myc. Eur. 1: 336 (1822)
≡ *Tremella saligna* Alb. & Schw., Consp. Fung. 303 (1805)

According to Streinz (1862), this is a synonym of *Propolomyces farinosus*. I have seen no original material, but the original description would support this synonymy.

(205). STICTIS SAGARETIAE Cash, Mycologia 35: 600 (1943)

Figure 96

Apothecia at first immersed, opening by a pore but not becoming erumpent, splitting the substrate irregularly, 0.4-0.8 mm diam., somewhat angular in outline, the margin white-pruinose, entire, not conspicuous, the disc moderately deeply immersed, pale ochraceous. Margin in cross section 20-30 µm thick, almost entirely crystalline, periphysoids few, inconspicuous. Subhymenium colorless, J+, of small, isodiametric, angular cells resting directly on host tissue. Paraphyses numerous, filiform, 1.0-1.5 µm broad, often branched and slightly inflated apically, J+ blue. Asci 65-80 x 7(-11) µm, very thick-walled when young, the cap 3.5 µm thick, pierced by a broad conical pore. Ascospores 8, 38-45 (-65, fide Cash) x 3.5 µm, with a thick gelatinous sheath, coiling when freed from the ascus.

On corticate twigs, tropical America. Iodine reactions and ascus structure will distinguish this species from any species of *Propolis*. Not likely to be confused with other *Stictis* spp.

SPECIMENS EXAMINED: NORTH AMERICA: USA (NY, on *Sagaretia*, Florida, Shear 433, isotype of *Stictis sagaretiae*). SOUTH AMERICA: Colombia (NY-Co 732, on *Cecropia*, Dto. Antioquia, Dumont, Haines, Velasquez, Fonnegra, 6.VII.1974; Co-721, Dto. Antioquia, *ibid.*, 5.VII.1974)

(206). STICTIS SAROTHAMNI Fckl., Jahrb. Nassauischen Vereins Naturk. 27-28: 48 (1873)

Figure 97

Apothecia at first immersed, gregarious, opening partially by a pore and partially by splitting the overlying substrate irregularly, 0.5-0.8 mm broad, the margin white or somewhat yellowish-pruinose, entire, the disc pale ochraceous, deeply immersed. Margin in cross section 175 µm thick, distinctly 3-layered, the wall colorless, c. 90 µm thick, of rather distantly-spaced, gelatinous, colorless hyphae 1.5 m diam., the crystalline layer prominent, of large, non-rosettiform crystals, the periphysoids 50 x 1.5 µm, numerous, sometimes branched, forming a compact layer. Subhymenium colorless, of small, angular cells, resting on an inconspicuous continuation of the wall. Paraphyses 1.0 µm diam., not enlarged apically, branched but not circinate, J-. Asci 180-200 x 4(-5) µm, the cap 4 µm thick, pierced by an angular pore. Ascospores nearly as long as the asci, c. 1.5 µm broad. The material I examined was slightly immature and contained no septate spores.

On *Sarothamnus* and rope, Europe. This does not resemble *Stictis mollis*, with which Rehm (1887-96) and Saccardo (1889) compared it. It seems to be distinct from immature *S. radiata*, and to differ from *S. hydrangeae* principally in having non-circinate paraphyses and a thinner ascus cap.

SPECIMENS EXAMINED: EUROPE: Austria (FH, Herbier Barbey-Boissier 1093, on *Sarothamnus*, Steinberg, Oestrich (Nassau), leg. Fuckel, isotype of *Stictis sarothamni*)(PAD, Fungi Rhenani 2670, isotype)(S, on rope, N. Oesterreich, Strasser 1913, as *S. sulphurea* var. *luxurians*)

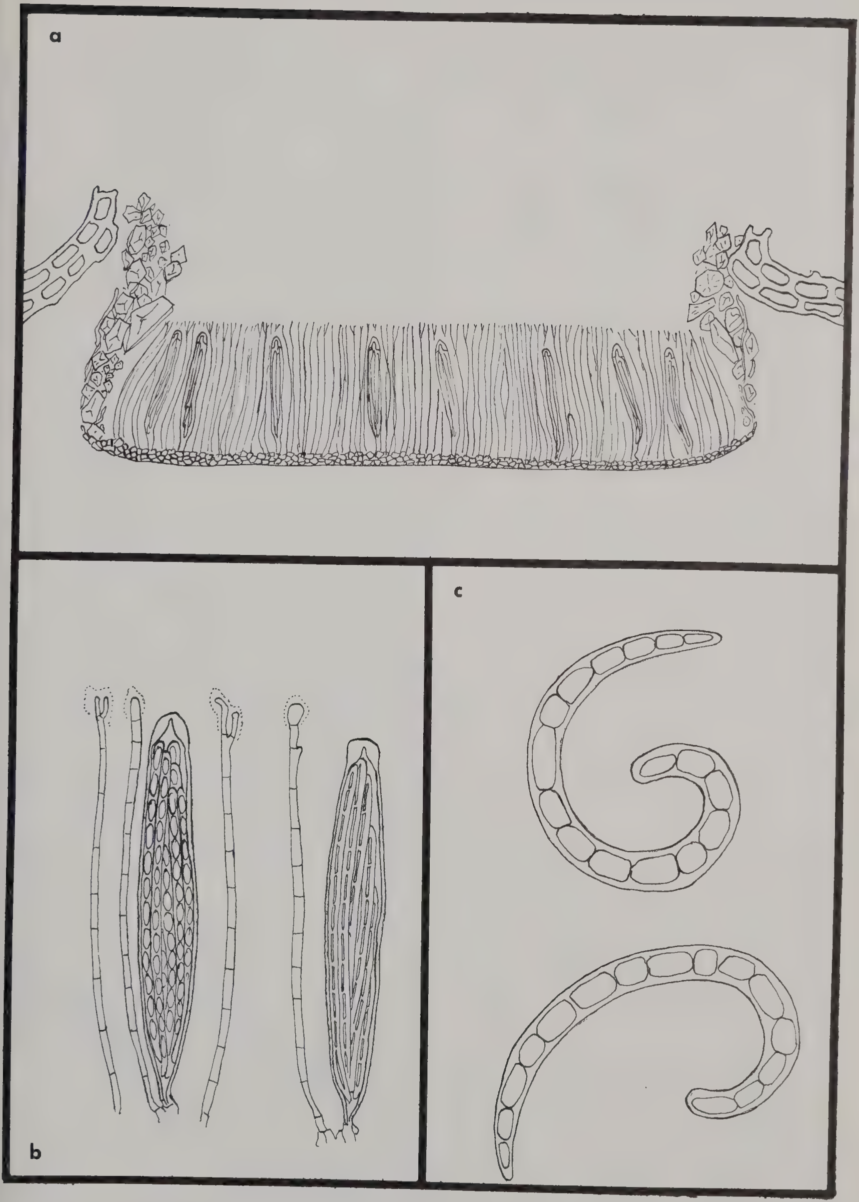

FIGURE 96. *Stictis sagaretiae*. a. Cross section of apothecium, x225. b. Asci, paraphyses, and spores, x750. c. Two ascospores, x1500. Drawn from NY-Co 732.

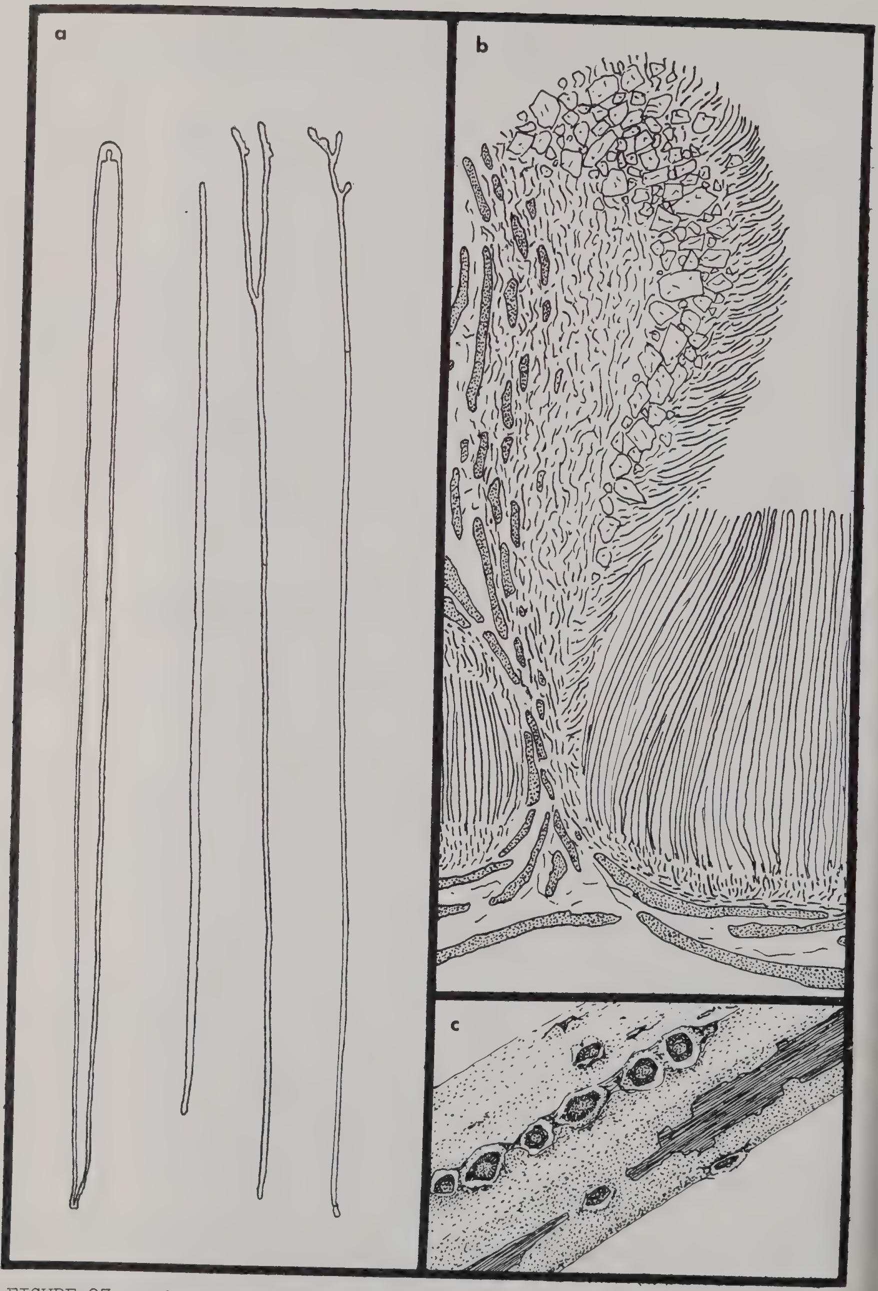

FIGURE 97. *Stictis sarothamni*. a. Ascus, paraphyses, and spore, x750. b. Cross section of margin, x225. c. Habit sketch, x7.5. Drawn from FH-Herbier Barbey-Boissier 1095.

(207). STICTIS SCHIZOXYLOIDES Ellis & Everhart, Proc. Philadelphia Acad. Sci. 46: 150 (1894)
= *Stictis edwiniae* Clements, Bull. Torrey Bot. Club 30: 86 (1903)
= *Stictis curtispora* Dearness & Bisby, Fungi Manitoba 64 (1929)

Figure 98

Apothecia at first immersed, soon becoming erumpent and at length nearly superficial, 0.7-1.5(-2.0) mm diam., the margin black, dark grey-pruinose, entire to somewhat lacerate, splitting away from the hymenium when dry, the disc grey, not deeply urceolate, somewhat pruinose. Margin in cross section 100 μm thick, without a distinct crystalline layer, continuing beneath the subhymenium, consisting of an outer layer of compacted dark brown hyphae 2.0 μm diam. giving rise to a tissue of loosely-interwoven colorless hyphae and thence to branched periphysoids 50 x 1.5 μm, colorless, numerous, forming a compact layer. Subhymenium c. 15 μm thick, of small, colorless, angular cells, intensely J+ blue, resting on a continuation of the wall 80 μm thick, Paraphyses colorless, 1.0 μm broad, enlarged to 2.0-3.0 μm at the fusiform tip (which may be septate), crystalliferous, strongly J+ blue, forming an epithecium. Asci cylindrical, short-stipitate, 65-70 x 10 μm, very thick-walled when young, the cap 3.0 μm thick. Ascospores 8, 55-60 x 2.0-2.5 μm, usually 7-septate, not sheathed or coiling.

On wood and bark, western North America. Also reported by Gilenstam (1974) from Sweden. The known collections are from arid and cold habitats unlikely to be frequented by mycologists; the species may well be common. It seems quite isolated from other species of *Stictis* because of the thick, non-crystalliferous margin and asci which appear bitunicate, but cannot be accomodated elsewhere in the classification. I have not been able to locate the type of *S. edwiniae*, but the description fits this species.

SPECIMENS EXAMINED: NORTH AMERICA: Canada (DAOM, on *Populus*, Winnipeg, Manitoba, 9.I.1926, Bisby 2160, isotype of *Stictis curtispora*). USA (TRTC 47648, on *Ephedra*, Arizona, Malloch 18.IV.1972)(CUP-D-5821, Crypt. F. Colorado 72, on *Salix*, Clements 3.X.1904; D-142, on *Salix*, Montana; D-7648, Sheridan, Montana, isotype of *Stictis schizoxyloides*; D-7711, on *Fraxinus*, Colorado, Crandall 331. 24.III.1898; D-9367, Ellis & Everhart, North American Fungi 3540, on *Salix*, Montana, 1896; D-1749, on *Salix*, Montana, Kelsey)

(208). (STICTIS SERENOAE) Cash, Mycologia 35: 599 (1943)
= *Propolis quadrifida* (Lév.) Mont.?

Although microanatomically very similar to *P. quadrifida*, this may be a distinct species of *Propolis* (Phacidiales). For a discussion, see Sherwood (1977).

(209). (STICTIS SERIATA) Lib., Pl. Crypt. Ard. 3, 233 (1834)
≡ *Merostictis seriata* (Lib.) Défago, Sydowia 21: 49 (1967)
= *Peziza obvelata* de Lacroix in Rabenh., F. Eur. 422 (1862)

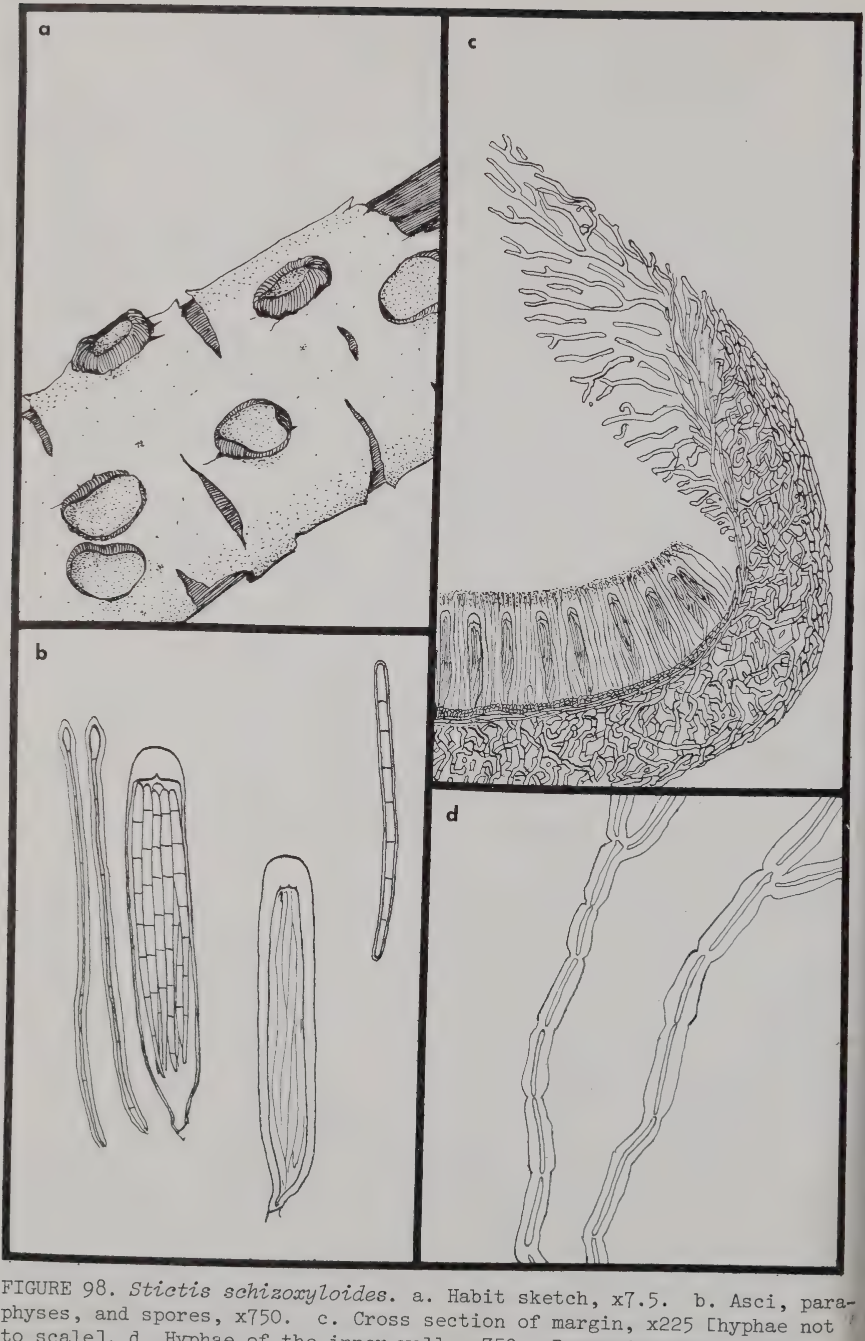

FIGURE 98. *Stictis schizoxyloides*. a. Habit sketch, x7.5. b. Asci, paraphyses, and spores, x750. c. Cross section of margin, x225 [hyphae not to scale]. d. Hyphae of the inner wall, x750. Drawn from Ellis & Everhart, N. Am. Fungi 3540 (CUP-D).

≡ *Stictis obvelata* (de Lacr.) de Not., Comment. Soc. Crittog. Ital. 1: 367 (1864)

Additional synonyms, and a redescription of the species, are provided by Défago (1967). *S. seriata* is Dermateaceous.

(210). STICTIS SERPENTARIA Ell. & Everh., Bull. Torrey Bot. Club 24: 469 (1897)

Figure 99

Apothecia at first immersed, opening by a pore and becoming somewhat erumpent, orbicular, 1.5-3.0 mm diam., the margin thick, grey-pruinose, entire to lacerate, the disc moderately deeply urceolate, also grey-pruinose. Margin in cross section 200 µm thick, 2-layered, the wall consisting of tightly-packed non-gelatinous dark brown hyphae 1.5-2.5 µm diam., the crystalline layer indistinct, consisting of small crystals irregularly scattered throughout the upper portion of the wall. Periphysoids 40-50 x 1.0-1.5 µm, branched, imbedded in a gelatinous matrix, J-. Subhymenium c. 10 µm thick, of small colorless angular cells, J- or J+, resting on brown wall tissue. Paraphyses numerous, filiform, 1.0 µm broad below, 1.5-2.0 µm broad at the tip, once or twice branched apically, J+, imbedded in brown amorphous material and forming an epithecium. Asci 350-400 (-500, fide Goree, 1972) x 12-14(-20) µm, the cap 6-7 µm thick, pierced by a broad conical pore. Ascospores 8, nearly as long as the asci, 4-5(-6) µm broad, sheathed, coiling when freed from the ascus, the cells 3-5 µm long.

On wood, western North America. The distribution of this species and the characters which distinguish it from *S. pachyspora* are reviewed by Goree (1972). This distinctive species is apparently quite rare.

SPECIMEN EXAMINED: NORTH AMERICA: USA (CUP-D 7644, on *Salix*, Washington State, Suksdorf 481, 18.IX.1894, isotype of *Stictis serpentaria*)

(211). STICTIS SESLERIAE Lib.
= *Stictis arundinacea* Pers., q.v.

(212). (STICTIS SICROSTOMA) Carmichael & Berkeley
≡ *Stictis microstoma* Carmichael & Berkeley, q.v.

(213). (STICTIS SPARSA) (Schw.) Sacc., Sylloge Fung. 8: 695 (1889)
≡ *Sphaerobolus sparsus* Schw., Trans. Amer. Philos. Soc. n.s. 4: 254 (1832)

As was noted by Berkeley (1873), the type specimen is extremely immature. The fruitbodies consist of a brown, non-periphysogenous, crystalliferous margin of interwoven hyphae surrounding filiform paraphyses with branched brown apices, and thick-walled cylindrical asci. This seems to be a *Schizoxylon*, but it is too immature to characterize.

SPECIMEN EXAMINED: NORTH AMERICA: USA (PH, herb. Schweinitz, sine loc., holotype of *Sphaerobolus sparsus*)(CUP-D 6655, isotype)

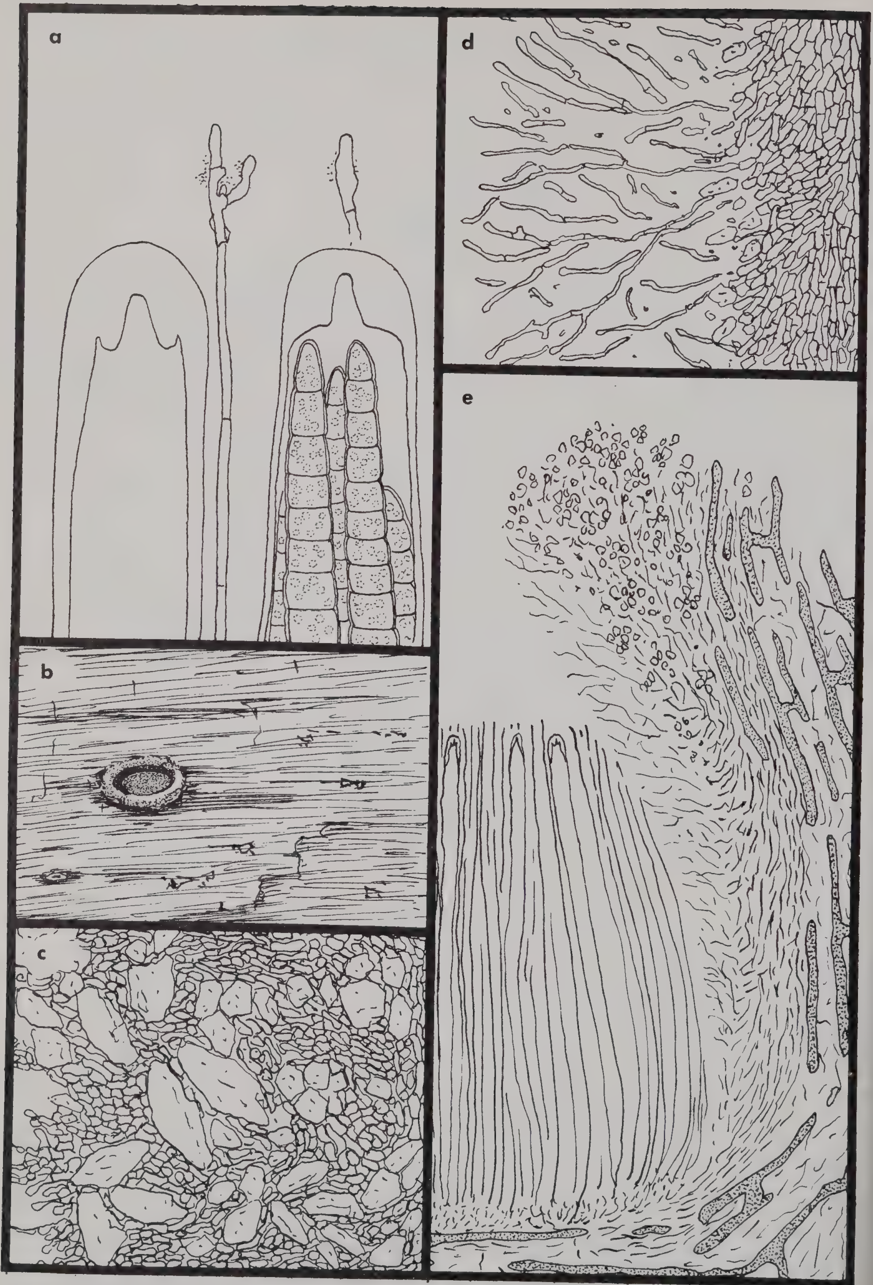

FIGURE 99. *Stictis serpentaria*. a. Detail of apices of asci, paraphyses, and spores, x1500. b. Habit sketch, x7.5. c. Detail of hyphae and crystalline inclusions in upper margin, x750. d. Periphysoids, x750. e. Cross section of margin, x150. Drawn from CUP-D-7644.

(214). (STICTIS SPHAERALIS) Fr., Syst. Mycol. 2(1): 194 (1822)
≡ *Laquearia sphaeralis* (Fr.) Fr., Summa Veg. Scand. sect. post. 366 (1849)

For a discussion of this species, see under *Laquearia*, above.

(215). STICTIS SPHAEROBOLOIDEA (Schw.) Berk. in Ell. & Everh., North Amercan Fungi 453 (1881)
≡ *Lichenopsis sphaeroboloidea* Schw., Trans. Amer. Philos. Soc. n.s. 4: 308 (1832)
= *Sphaerobolus crustaceus* Schw., l.c. 254 (1832)
≡ *Stictis crustacea* (Schw.) Sacc., Sylloge Fung. 8: 695 (1889)

Figure 100

Apothecia at first immersed, becoming erumpent, remaining for a long time closed, finally opening by a small and irregular pore, 1.0-2.0 mm diam., orbicular, white-pruinose or rarely faintly lilac-colored, the disc deeply urceolate, brown. Margin in cross section 2-layered, the wall consisting of small (c. 2.0 μm) pseudoparenchymatous cells, the periphysoids 6-8 x 1.5 μm, forming a compact layer in the upper part of the margin, disintegrating and imbedded in a gel in the lower part, J+ blue. An internal crystalline layer is absent, but the wall is crystalliferous on its outer face and splits away from the surrounding host substrate. Subhymenium c. 10 μm thick, of small, colorless, isodiametric cells, resting directly on host tissue. Paraphyses numerous, filiform, 450-650 x 1.0 μm, enlarged abrubtly at the tip which is 3.5-5 μm thick and brown, usually unbranched, J+. Asci strictly cylindrical, 450-650 x 7(-9) μm, the cap 5 μm thick, pierced by a broad pore. Ascospores 8, nearly equalling the asci, 2.0-2.5 μm broad, transversely multiseptate, the cells 4-5 μm long, or rarely (and abnormally) muriform.

On bark and wood, typically of *Quercus*, eastern North America. Fairly common. The taxonomic history of this species is reviewed under *Lichenopsis*, above. Schweinitz supposed that the fungus discharged its hymenium as a unit, since it eventually falls out of old specimens, leaving an empty hole. This is incorrect; many frutibodies can be found in which all of the asci have discharged, leaving a mass of agglutinated paraphyses within the fruitbody. This is the only Stictidaceous fungus with J+ blue periphysoids. The abnormal, muriform-spored form is discussed by Sherwood (1976).

SPECIMENS EXAMINED: NORTH AMERICA: USA (CUP-D 9353, Ell. & Ev., N. Am. Fungi 453, on *Cornus*, Pennsylvania; Atkinson herb., *ibid.;* D-6234, on *Populus*, New York, Peck; D-307, Burnett 1904, sine loc; D-7696, on *Rosa*, Illinois, Cobden 8.IV.1887)(PH, Bethlehem, Pennsylvania, herb. Schweinitz, holotype of *Lichenopsis sphaeroboloidea*)(NY, Alabama Biol. Survey 2202, Earle 12.X.1899)(B, Maryland, Petrak v.1950)

(216). (STICTIS SPHAEROIDES) Niessl., Hedwigia 15: 116 (1876)

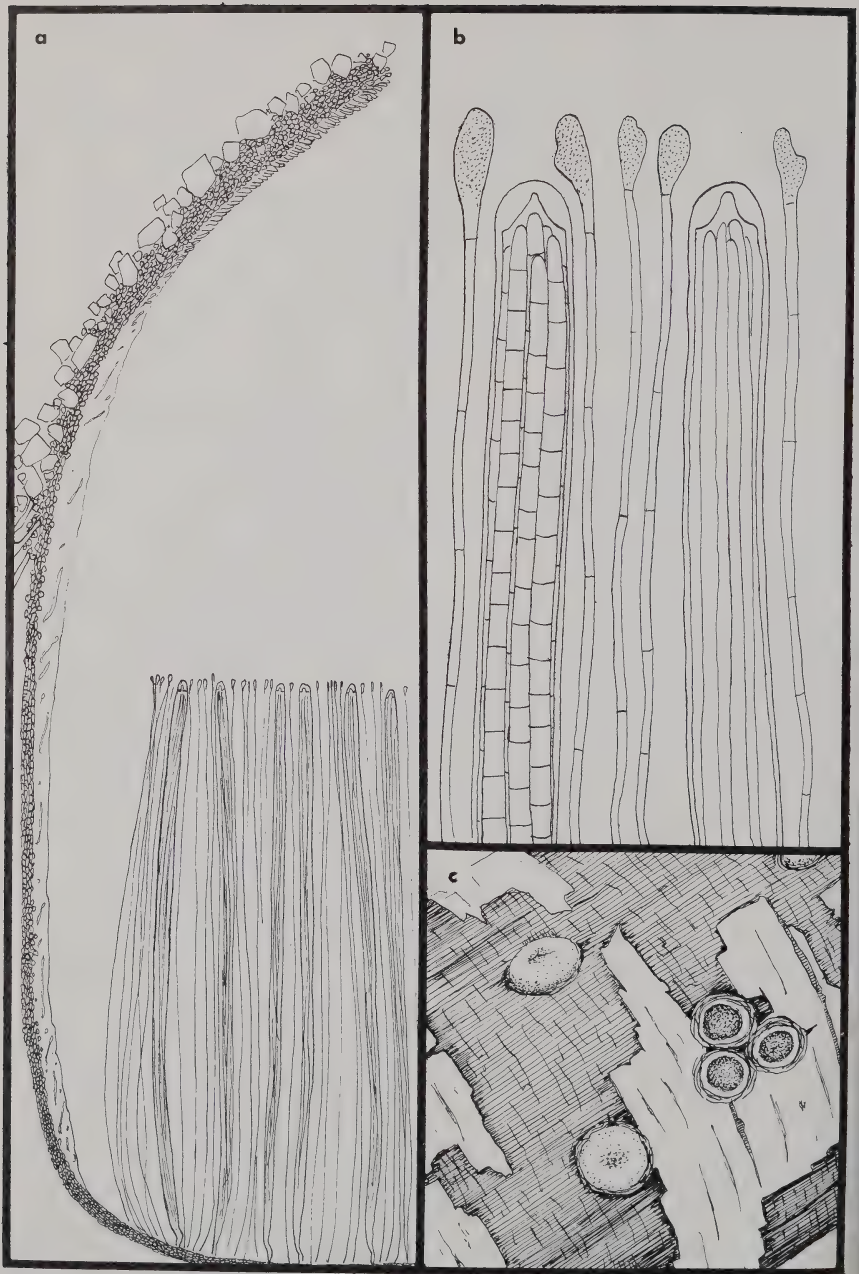

FIGURE 100. *Stictis sphaeroboloidea.* a. Cross section of ascocarp, x150. b. Detail of apices of asci, paraphyses, and spores, x1500. c. Habit sketch, x7.5. a-b drawn from the holotype. c drawn from Ell. & Ev., N. Am. Fungi 453 (CUP-D).

= *Pragmopara amphiloba* Massal., Framm. Lich. 13 (1855)

According to Groves (1967), from whom the above synonymy was taken, the species is allied to *Scleroderris* (Leotiaceae).

(217). STICTIS STELLA Schw., Trans. Amer. Philos. Soc. n.s. 4: 180 (1832)

The type specimen is extremely immature and contains no asci. It appears to be a *Stictis*, possibly *S. stellata.* or *S. radiata.*

SPECIMEN EXAMINED: NORTH AMERICA: USA (PH, herb. Schweinitz, Bethlehem, Pennsylvania, holotype of *Stictis stella*)

(218). STICTIS STELLATA Wallr., Fl. Crypt. Germ. 2: 144 (1833)

≡ *Schizoxylon stellatum* (Wallr.) Fckl., Jahrb. Nassauischen Vereins Naturk. 23-24: 251 (1870)
= *Stictis saccardoi* Rehm in Sacc., Michelia 2: 614 (1882)
= *Stictis pallidula* Sacc., Michelia 2: 614 (1882)

Figure 101

Apothecia at first immersed, opening broadly by a pore but not becoming erumpent, 0.4-0.8 mm broad, the margin narrow, white-pruinose, entire to lacerate, the disc deeply urceolate, pale ochraceous. Margin in cross section 40-70 µm thick, 3-layered, often with a poorly differentiated accessory thalline margin, the wall 20 µm thick, pseudoparenchymatous, of closely-packed cells 1.5-2.5 µm diam., colorless, the crystalline layer moderately well-developed, of heterogeneous non-rosettiform crystals. Periphysoids 10-20 x 1.5-2.0 µm, septate, unbranched, not gelatinous. Subhymenium c. 10 µm thick, of small, colorless, angular cells, J-. Paraphyses numerous, filiform, 1.0 µm broad below, barely enlarged above, simple to sparingly branched, J- or faintly J+. Asci 130-200 x 6(-8) µm, the cap 2.5-3.0 µm thick, pierced by a narrow, conical pore. Ascospores 8, 130-200 x 1.5-2.5 µm, septate, the cells 3-5 µm long.

On herbaceous stems, occasionally on wood, widespread a and common. *Stictis stellata* is distinguished from *S. radiata* by its predominantly herbicolous habit, broader, unbranched periphysoids, J- hymenium, and smaller size. Intergrades occur between the two species. *S. stellata* is characteristic of warmer climates than *S. radiata.*

No material examined by Wallroth could be located. I have designated Rabenhorst's Fungi Europaei 3161, which was widely distributed, as a tentative neotype which will preserve current usage of the name *Stictis stellata.*

SPECIMENS EXAMINED: EUROPE: Gread Britain (CUP 46392, on *Eupatorium*, Liverpool U. Myc. 1269)(IMI 71070, on *Hedera*, Sussex; 111458, on *Hedera;* 111491, on *Urtica;* 111329, on *Filipendula;* 111423, on *Filipendula*; 111383, on *Epilobium*). France (H, Rabenhorst-Wint., F. Eur. 3161, as *Schmitzomia elevata*, on *Rosa*, 28.X.1882, neotype [designated here] of *Stictis stellata*). ASIA: Ceylon (K, Berkeley 317, on *Thysanolana*). NORTH AMERICA: USA (CUP-D 7663, on *Arundinaria*, Louisiana, Langlois 1240, 27.III.1888; D-6555, ex herb. Schweinitz, labelled *S. pupula*)

(FH, on *Arundinaria*, Louisiana, Langlois 20.X.1890)(NY, on *Zea*, Louisiana, 21.XII.1896; on *Phytolacca*, New Jersey, Ellis IV.1894; on *Zea*, Ohio, Morgan 702). Mexico (OSC 32660, on *Abies*, Est. Mexico, Trappe 3286). Panama (NY-Pa 656, on palm, Prov. Veragua, Dumont, SE&SM Carpenter, 19.VI.1975; Pa-1300, Prov. Panamá, Dumont, Mori, SE&SM Carpenter, 28.VI.1975; Pa-2164, Prov. Chiriqui, Dumont & Carpenter, 4.VII.1975; Pa-1817, *ibid.*, 3.VII.1975). SOUTH AMERICA: Ecuador (FH-Patouillard, Quito, 1892, Lagerheim)(NY-Ec 2148, Prov. Morona Santiago, Dumont, Carpenter, Buriticá, 3.VIII.1975; Ec-2278, Prov. Pichincha, *ibid.*, 6.VIII.1975; Ec-1950, Prov. Zamora, *ibid.*, 1.VIII.1975; Ec-1820, *ibid.*, 31.VII.1975; Ec-1494, Prov. Napo, *ibid.*, 26.VII.1975). Venezuela (NY-Ve 801, Dto. Federal, Dumont, Haines, Manara, 26.VI.1971; Ve-2582, Edo. Merida, Dumont, Haines, Samuels, Silverborg, Borjas, 20.VII.1971; Ve-6126, Dto. Federal, Dumont, Cain, Samuels, 27.VII.1972; Ve-2815, Edo. Merida, Dumont, Samuels, Borjas, 23.VII.1971; Ve-2582, *ibid.*, 20.VII.1971)(CUP-Vz 1324, Est. Yaracuy, 27.IX.1932, Chardon). Peru (NY-Pe 150, Prov. Junin, Dumont et al., 1976; Pe-435; 590; 769; 591; 775; 706; 737; 373; 385, Dumont et. al., 1976). Colombia (NY-Co 1769, Dto, Antioquia, Dumont & Haines, 21.VII.1974; Co-4296, Dto. Boyacá, Dumont et al., 1976; 6325, Dto. Antioquia, Dumont et al., 1976; 6922; 7123; 7543; 8185a; 5544; 5817 [all Dumont et. al., 1976]).

(219). (STICTIS STEREICOLA) Berk. & Curt.
≡ *Cryptodiscus stereicola* (Berk. & Curt.) Sherwood, q.v.

(220). (STICTIS STICTICA) (Fr.) Fr., Syst. Mycol 2(1): 197 (1822)
≡ *Hysterium sticticum* Fr., Vet. Akad. Handl. 1819: 91 (1819), n.v.
≡ *Xylogramma sticticum* (Fr.) Wallr., Fl Crypt. Germ. 2: 509 (1833)
≡ *Xylographa stictica* (Fr.) Fr., Summa Veg. Scand. sect. post. 362 (1849)
≡ *Durella stictica* (Fr.) Nannf., Nova Acta Regiae Soc. Sci. Upsal. ser. 4, 8(2): 293 (1932)

Accepted by Rehm (1887-96) and Nannfeldt (1932) as a *Xylogramma* (or *Durella*). I can find no record of critical examination of Friesian material.

(221). STICTIS STIGMA Cke. & Ell., Grevillea 7: 9 (1887)
Figure 102

Apothecia at first immersed,,opening by a pore and finally becoming somewhat erumpent, 1-2 mm broad (-3 mm, according to Cooke & Ellis, l.c.), the margin thick, inrolled, appearing brown because of included host tissue, rather fleshy when wet, splitting away from the hymenium when dry, the disc deeply immersed, ochraceous pruinose. Margin consisting of a thalline covering layer 20 µm thick of mixed host tissue and hyphae surrounding a thick wall 50-60 µm thick of interwoven colorless hyphae 1.0 µm diam., somewhat gelatinous. Periphysoids 15 x 1.0 µm, colorless, simple. Crystalline layer absent. Subhymenium barely noticeable, resting on 20 µm of colorless, J- wall. Hymenium intensely J+ throughout. Paraphyses simple, barely enlarged above, colorless. Asci 125-150 x 8(-12) µm, the cap 1.5 µm thick. Spores 8, c. 100 µm long, soon breaking up

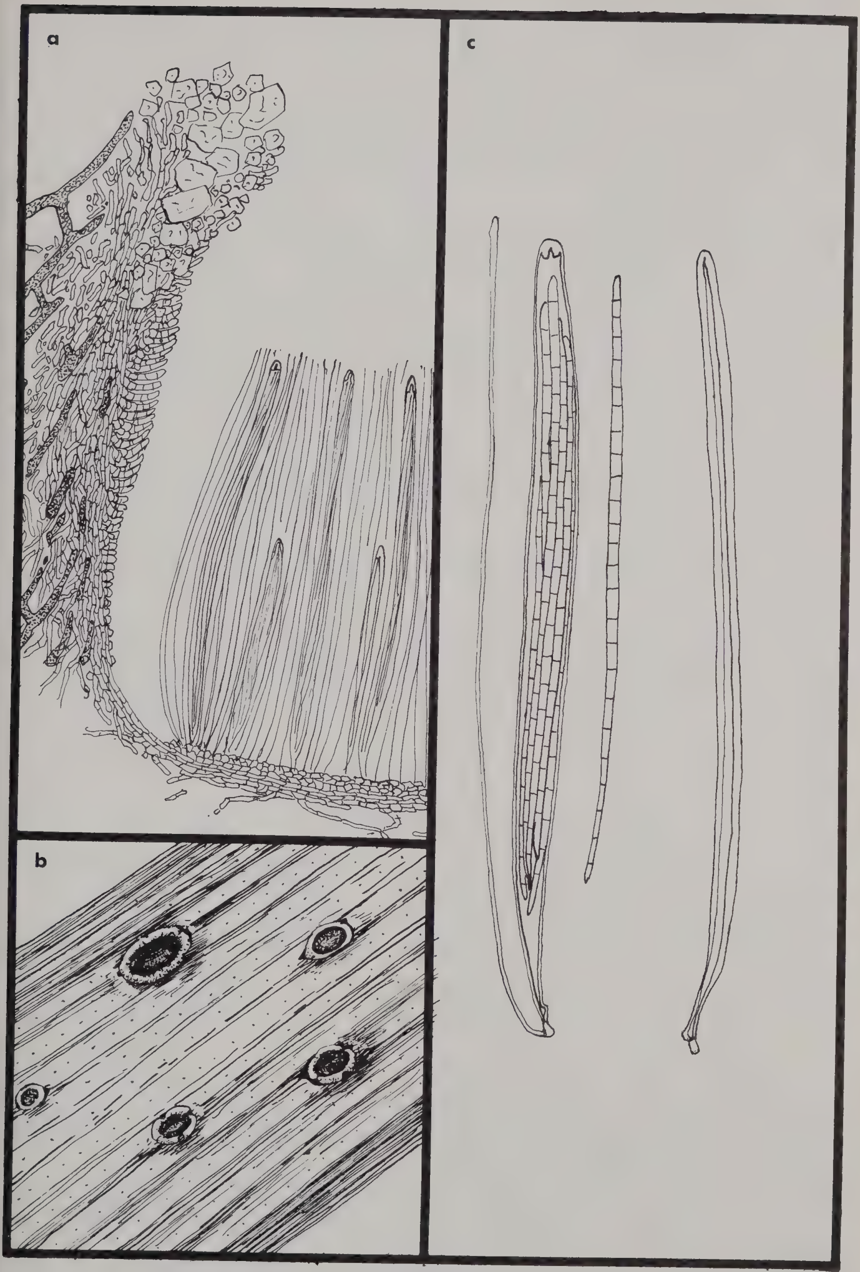

FIGURE 101. *Stictis stellata*. a. Cross section of margin, x300. b. Habit sketch, x7.5. c. Asci, paraphysis, and spores, x750. Drawn from CUP 46392.

into short cylindrical 1-celled fragments 2.5-3 x 3-5 µm.

On dead twigs, New Jersey. Like *Stictis monilifera*, this species is remote from *Schizoxylon* and *Acarosporina*, despite the disarticulating spores. The two specimens (in CUP-D and CUP-A) I have seen of Ellis & Everhart, North American Fungi 855, distributed as this species, are immature and apparently misidentified, since they have brown marginal hyphae.

SPECIMENS EXAMINED: NORTH AMERICA: USA (K, Ellis 2526, on *Cornus*, ex herb. Cooke, holotype of *Stictis stigma*)(CUP-D 7702, on dead twigs of *Cornus florida*, Ellis, 8 Nov. 1877 [authentic])

(222). (STICTIS STROBILINA) Cooke, Grevillea 11: 107 (1883)
≡ *Propolis rhodoleuca* (Sommerf.) Fr. var. *strobilina* (Cooke) Phil., Brit. Discom. 375 (1887)
≡ *Stictis versicolor* Fr. var. *strobilina* Desm., Ann. Sci. Nat. Bot. sér. 2, 19: 366 (1843)?

Rehm (1887-96) equated *S. strobilina* Cooke with Desmazières's subspecies, but there is no reference, direct or indirect, in Cooke's publication to Desmazières.

(223). *STICTIS SULPHUREA* Rehm
= *Stictis friabilis* (Phil. & Plowr.) Sacc. & Trav., q.v.

(224). (STICTIS TENUIS) Fr., Syst. Mycol. 2(1): 195 (1822)

The type specimen consists of regular ecorticate circular depressions on a stick. The pattern may have been caused by erumpent fungal fruitbodies, but no trace of these remains.

SPECIMEN EXAMINED: EUROPE: Sweden (UPS, Femsjö, herb. Fries, holotype of *Stictis tenuis*)

(225). (STICTIS TERRESTRIS) S.F. Gray, Nat. Arr. Brit. Pl. 1: 663 (1821)
≡ *Peziza immersa* Sowerby, Engl. Fungi pl. 389 (1802)

Sowerby's illustration suggests that this small, immersed, terricolous fungus, with an obvious hymenium visible at low magnification, is probably a member of the Pezizales.

(226). (STICTIS THELOTREMA) Mont. in de la Sagra, Hist. Physique, politique et naturelle d l'isle de Cuba 9: 356 (1841)

I received no answer to my inquiries for this species from PC, and it is unrepresented in the collections at FH. The original description suggests that this is probably a lichen in the Thelotremataceae.

(227). (STICTIS THELOTREMA) Dur. & Lév.
≡ *Stictis oculiformis* Sacc., q.v.

(228). *STICTIS THELOTREMOIDES* Phil. & Kalchbr.
= *Stictis radiata* Pers., q.v.

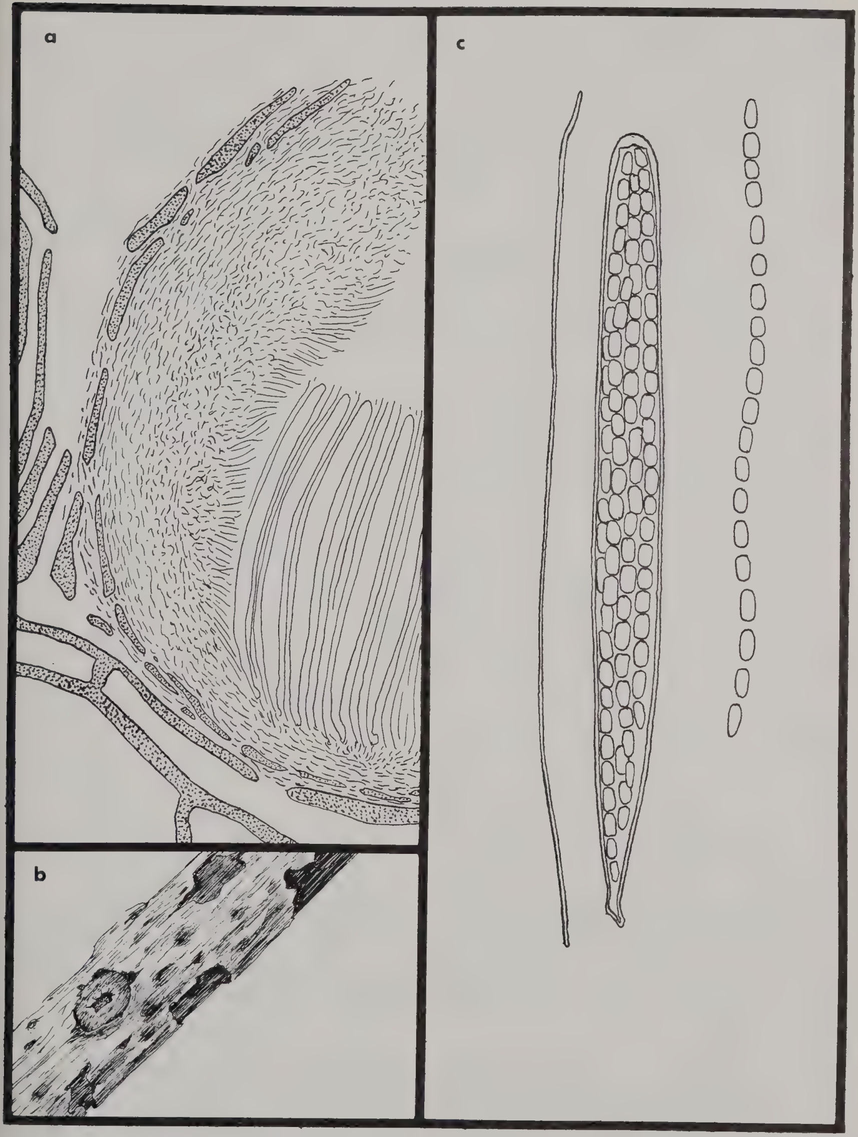

FIGURE 102. *Stictis stigma*. a. Cross section of margin, x375. b. Habit sketch, x7.5. c. Ascus, paraphysis, and spores, x750. Drawn from CUP-D 7702.

(229). *STICTIS TILAKII* Kale & Kale, Maharashtra Vidnyan Patrika 5: (1970)

I have been unable to locate a copy of the reference or specimens of this species, which is cited in a key by Tilak and Nanir (1975). Not cited in Index of Fungi.

(230). (STICTIS THIERRYANA) Roum., Fungi Gallici Exs. 1854 (1882)(nom. nud.)

The specimen which I examined contained long curved spores, but no asci. It was invaded by hyphomycetes, and may have been a coelomycete, or perhaps *Coccomyces*, but certainly not *Stictis*.

SPECIMEN EXAMINED: EUROPE: France (CUP-D 11364, F. Gall. Exs. 1854, on *Fraxinus*, labelled *Stictis thierryana*)

(231). (STICTIS TILIAE) Lasch in Rabenh., Bot. Zeit. 3: 66 (1845)
= *Platygloea disciformis* (Fr.) Neuhoff, Ark. Bot. 28(1): 56 (1936)

Additional synonyms of this species, a Basidiomycete, are given by Bandoni (1956).

SPECIMEN EXAMINED: EUROPE: Germany (FH-Höhnel, Klotzsch, Herb. Myc. 638, isotype of *Stictis tiliae*)

(232). (STICTIS TITHYMALINA) (Kunze) Rehm, Ascomyceten 312 (1878)
≡ *Calloria tithymalina* Kunze, Hedwigia 15: 105 (1876)
≡ *Naevia tithymalina* (Kunze) Rehm in Rabenh., Krypt.-Fl. ed. 2, 1(3): 139 (1888)
≡ *Naeviopsis tithymalina* (Kunze) Hein, Willdenowia Beih. 9: 64 (1976)

Additional synonyms, and a redescription of the species, a member of the Naevioideae (Dermateaceae) are provided by Hein (1976)

(233). STICTIS TROPICALIS Speg.
= *Stictis radiata* Pers. subsp. *intermedia* (Speg.) Sacc., q.v.

(234). (STICTIS TSUGAE) Farlow, Appalachia 3: 245 (1883)
≡ *Fabrella tsugae* (Farl.) Kirschst., Hedwigia 90: 131 (1941)

Korf (1962) referred *Fabrella* to the Hemiphacidiaceae (Helotiales). The species is clearly not Stictidaceous in the present sense.

(235). STICTIS UBERRIMA (Castagne) Mont., Ann. Sci. Nat. Bot. sér. 3, 12: 315 (1849)
≡ *Sphaeria uberrima* Cast., Cat. Pl. Marseilles 172 (1845)

I received no answer to my inquiries for this species from Castagne's herbarium (CN). The description suggests that it is a dark *Stictis* allied to *S. mollis*.

(236). (STICTIS ULMI) Crouan & Crouan, Fl. Finist. 42 (1867)
≡ *Propolis ulmi* (Crouan & Crouan) Sacc., Sylloge Fung. 8: 652 (1889)

The type of this species, if extant, cannot be borrowed. According to the original description the spores were fusiform and 13-guttulate. The species cannot be characterized from this description, but is probably neither a *Stictis* nor a *Propolomyces*.

(237). STICTIS UMBELLATARUM Schw.
= *Stictis radiata* Pers., q.v.

(238). (STICTIS URTICAE) Crouan & Crouan, Fl. Finist. 42 (1867)
≡ *Propolis urticae* (Crouan & Crouan) Sacc., Sylloge Fung. 8: 654 (1889)

The type of this species cannot be borrowed. From the original description, it may possibly be a *Propolomyces*.

(239). (STICTIS VACCINII) Ell. & Everh., Proc. Acad. Nat. Sci. Philadelphia 46: 352 (1894)
= *Propolis phacidioides* (Fr.) Corda

For a description of this species, a member of the Phacidiales, see Sherwood (1977).

(240). STICTIS VALDIVIENSIS Speg.
= *Stictis lupini* Phil. & Harkn., q.v.

(241). (STICTIS VALVATA) Mont., Ann. Sci. Nat. Bot. sér. 2, 6: 337 (1836)
≡ *Hysterostegiella valvata* (Mont.) Höhn., Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Kl. Abt. 1, 126: 313 (1917)

Additional synonyms, and a redescription of this species, a member of the Dermateaceae, are given by Défago (1967).

(242). (STICTIS VARIOLOSA) Pers. in Gaudichaud, Voyage d l' Uranie 178 (1826)

No material of this species could be located. According to the original description it was common on the bark of trees on the island of Rawak and resembled *Propolomyces farinosus*, but with a more regular form. The species may be a lichen, but cannot be characterized from this description.

(243). (STICTIS VERSICOLOR) Fr., Syst. Mycol. 2(1): 198 (1822)
≡ *Melittosporium versicolor* (Fr.) Corda, Icones Fung. 2: 38 (1838)
≡ *Propolis versicolor* (Fr.) Fr., Summa Veg. Scand. sect. post. 372 (1849)

Although the name has been widely used for *Propolomyces farinosus*, it would seem to be tied to the only specimen mentioned when Fries first applied the name. This is Scleromycetes Sueciae 276, a hysterothecial Loculoascomycete and the type of *Melittosporium*. A brief discussion of the species appears under *Melittosporium*, above.

SPECIMEN EXAMINED: EUROPE: Sweden (FH, Fries, Scleromycetes Sueciae 276, isotype of *Stictis versicolor*)

(244). STICTIS VINCAE Ellis
= *Stictis pustulata* Ell. & Everh., q.v.

(245). STICTIS VIRGINEA Cke. & Phil., Grevillea 8: 64 (1879)
Figure 103

Apothecia at first immersed, opening by splitting the substrate longitudinally and at length becoming somewhat erumpent, 0.5-1.0 mm diam., somewhat elongate, white-pruinose, remaining for a long time closed and finally opening by a longitudinal slit or by splitting irregularly, the disc deeply urceolate, pale ochraceous, the margin appearing annulate. Margin in cross section c. 200 μm thick, 2-layered, the wall 100 μm thick, of interwoven colorless hyphae 1.5 μm diam. interspersed with large, colorless, non-rosettiform crystals, abundantly crystalliferous on the outer face and splitting away from the substrate. Periphysoids 100 x 1.0-1.5 μm, richly branched, somewhat gelatinous, J-. Subhymenium c. 30 μm thick, resting on 30 μm of wall tissue, J-. Paraphyses numerous, filiform, unbranched, vaguely circinate, not enlarged above, 1.0 μm thick, J-. Asci 300 x 5(-6) μm, the apical cap 6 μm thick, complex, apparently formed of two superimposed rings. Ascospores 8, nearly as long as the asci, 1.0 μm broad, septate, the cells 8-10 μm long.

On twigs, New Zealand. Very similar in external appearance to *S. ostropoides*, but easily distinguished from that species by the longer, narrower ascospores.

SPECIMEN EXAMINED: AUSTRALASIA: New Zealand (K, Waitaki, Bergren 289, holotype of *Stictis virginea*)

(246). (STICTIS VIRIDIS) Pers., Myc. Eur. 1: 338 (1822)

Cited by Fries (1822) as a synonym of *S. versicolor "c"*, this may be an older name for that species. Fries synonymizes *Hysterium viride* Fr. (1819), but there is no evidence in Persoon's description to connect *Stictis viridis* with *Hysterium viride*. I have seen no original Persoonian material.

(247). STICTIS VITICOLA Sherwood, spec. nov.
Figure 104

Ascocarpi primum immersi, profunde cupulati, 0.5-0.7 mm diam., margine integro vel lacerato, griseo, disco pallide ochraceo. Margo in sectione transversali 175 μm crassus, siccus ab hymenio se abrumpens, hypharum pariete 1.5 μm diam., brunneo. Stratum crystallinum 150 μm crassum. Periphysoidea 20 x 1.0 μm, ramosa. Paraphyses filiformes, simplices, 400 x 1.0 μm, apice ad 2.0 μm incrassatae, achromae, in iodo caerulescentes. Asci 400 x 5.5-6(-7) μm, apice 5.0 μm crassi, 8-spori. Sporae 375-400 x 2.0 μm, cellulis 4-6 μm longis.

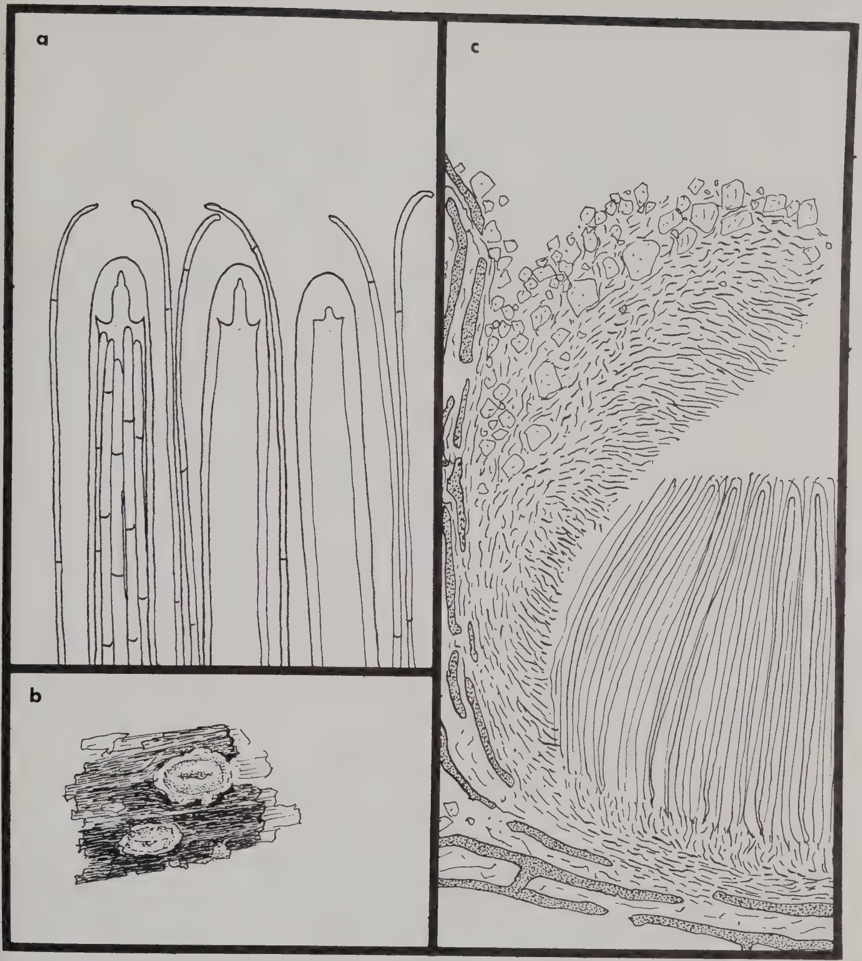

FIGURE 103. *Stictis virginea.* a. Detail of apices of asci, paraphyses, and spores, x1500. b. Habit sketch, x7.5. c. Cross section of margin, x150. Drawn from the holotype.

HOLOTYPUS: NY, on *Vitis rotundifolia,* Auburn, Lee Co., Alabama, USA, 11/7/1897, F.S. Earle. Isotype: CUP-D-7723.

Apothecia at first immersed, opening by a broad pore, the margin raised but not truly erumpent, 0.5-0.7 mm diam., orbicular in outline, the margin very thick, grey-pruinose, entire to lacerate, the disc deeply immersed, pale ochraceous. Margin in cross section 175 μm thick, with a prominent, colorless, accessory thalline margin, the wall dark brown, c. 20 μm thick, of interwoven hyphae 1.5 μm diam., the crystalline layer very prominent, of heterogeneous non-rosettiform crystals, the periphysoids 20 x 1.0 μm, with gelatinizing walls, branched, J-. Subhymenium resting directly on disintegrating host tissue, colorless, J-, of small angular cells, c.20 µm thick. Paraphyses numerous, filiform, 1.0 µm thick, colorless, unbranched, enlarged to 2.0 µm at the apex, J+ blue. Asci 400 x 5.5-6(-7) µm, the cap 5.0 µm thick, pierced by a broad conical pore. Spores 375-400 x 2.0 µm, septate, the cells 4-6 µm long.

On *Vitis*, Alabama. This species is unusual among *Stictis* species with a dark wall in possessing J+ paraphyses. Narrower spores and longer asci will distinguish it from *Stictis bicolor*.

SPECIMENS EXAMINED (see also holotype, above): NORTH AMERICA: USA (NY, on *Vitis*, Earle & Baker, 3/24/1897, Alabama [=CUP-D 7722]; on *Vitis*, Earle & Baker, 3/24/1897, Alabama [=CUP-D 7721]).

(248). STICTIS XENOSPORA Sherwood, spec. nov.

Figure 105

Ascocarpi primum immersi, profunde cupulati, 0.5-0.8 mm diam., margine integro, albo vel ochraceo, disco pallide ochraceo. Margo in sectione transversali 120 µm crassus, siccus ab hymenio se abrumpens, hypharum pariete 1.5-2.5 µm diam., achromo. Stratum crystallinum 50 µm crassum. Periphysoidea 8-10 x 2.5 µm, non ramosa. Paraphyses filiformes, ramosae, 400 x 1.0 µm, apice ad 1.5 µm incrassatae, achromae, in iodo caerulescentes. Asci 400 x 10-11(-20) µm, apice 9 µm crassi, 8-spori. Sporae 350-375 x 5-6.5 µm, vagina gelatinosa involutae, cellulis 5-6 µm longis.

HOLOTYPUS: CUP-Me 192, on a branch, km. 945 on Hwy. 190 between Tehuantepec and San Cristobal de las Cruces, K. P. Dumont, 13.VIII.1967, Mexico.

Etymology: Strange-spored. The immature spores, with a massive sheath and nearly invisible cell lumen, resemble ghosts.

Apothecia at first immersed, opening by a pore but not becoming erumpent, 0.5-0.8 mm diam., the margin entire, moderately thick, white or faintly yellowish-pruinose, the disc deeply urceolate, pale ochraceous, splitting away from the margin when dry. Margin in cross section 120 µm thick, the wall 15-20 µm thick, of interwoven colorless hyphae 1.5-2.5 µm diam., not notably gelatinous. Crystalline layer prominent, of large, colorless, non-rosettiform crystals. Periphysoids 8-10 x 2.5 µm at the base, tapering to a point, forming a compact layer, unbranched. Subhymenium colorless, of small angular cells resting directly on disintegrating host tissue. Paraphyses numerous, filiform, 1.0 µm diam. below, a little enlarged and usually branched above, faintly J+ blue. Asci 400 x 10-11(-20) µm, the cap 9 µm thick, complex, appearing to consist of two superimposed rings. Ascospores 8, 350-375 x 5-6.5 µm, with a very prominent gelatinous sheath when young, obviously sheathed when mature, septate, slightly constricted at the septa, the cells 5-6 µm long.

On twigs, Mexico and Venezuela. The type of *Stictis moelleriana*, the only other species with spores of these dimensions, has been lost; for reasons discussed under *S. moelleriana*, *S. xenospora* is thought to be distinct.

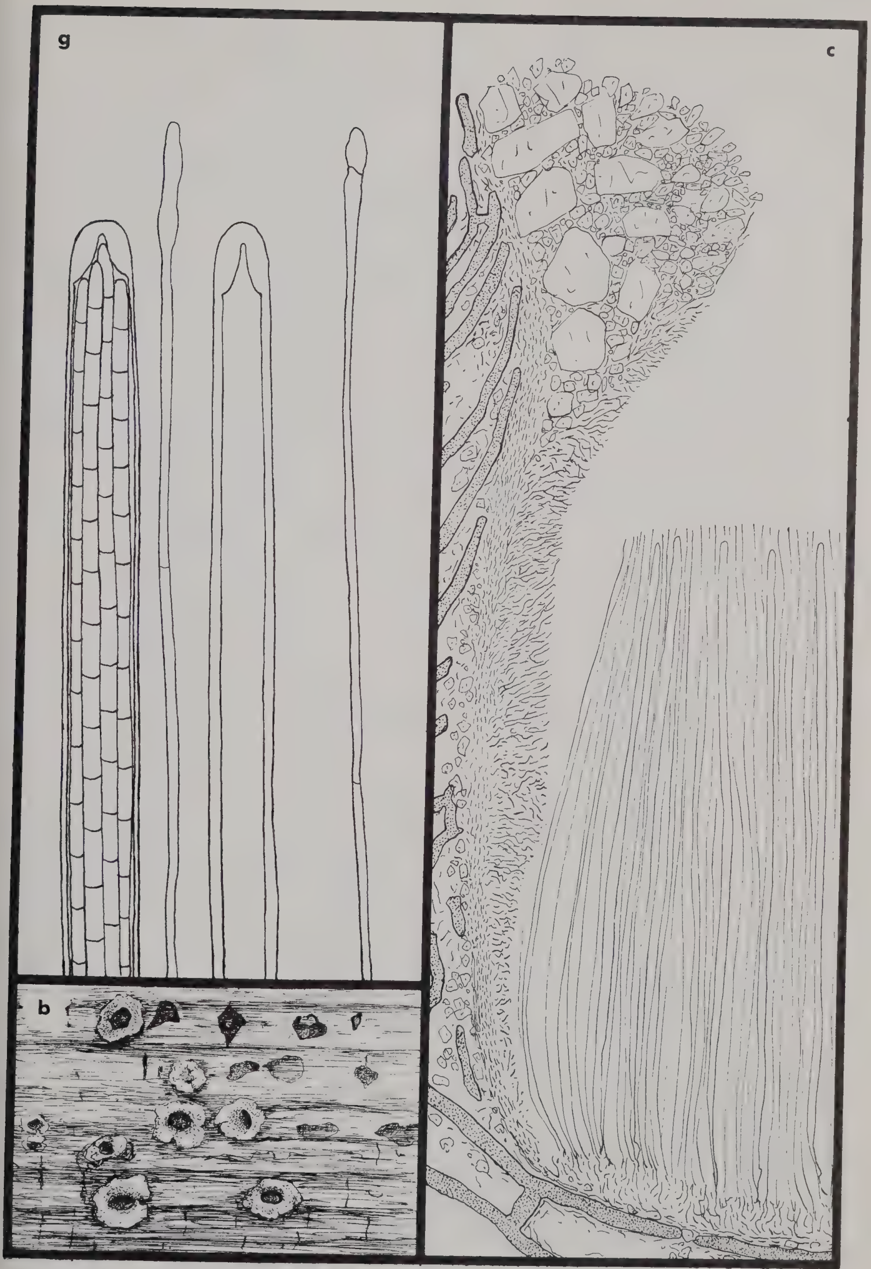

FIGURE 104. *Stictis viticola.* a. Detail of apices of asci, paraphyses, and spores, x1500. b. Habit sketch, x7.5. c. Cross section of margin, x225. Drawn from the holotype.

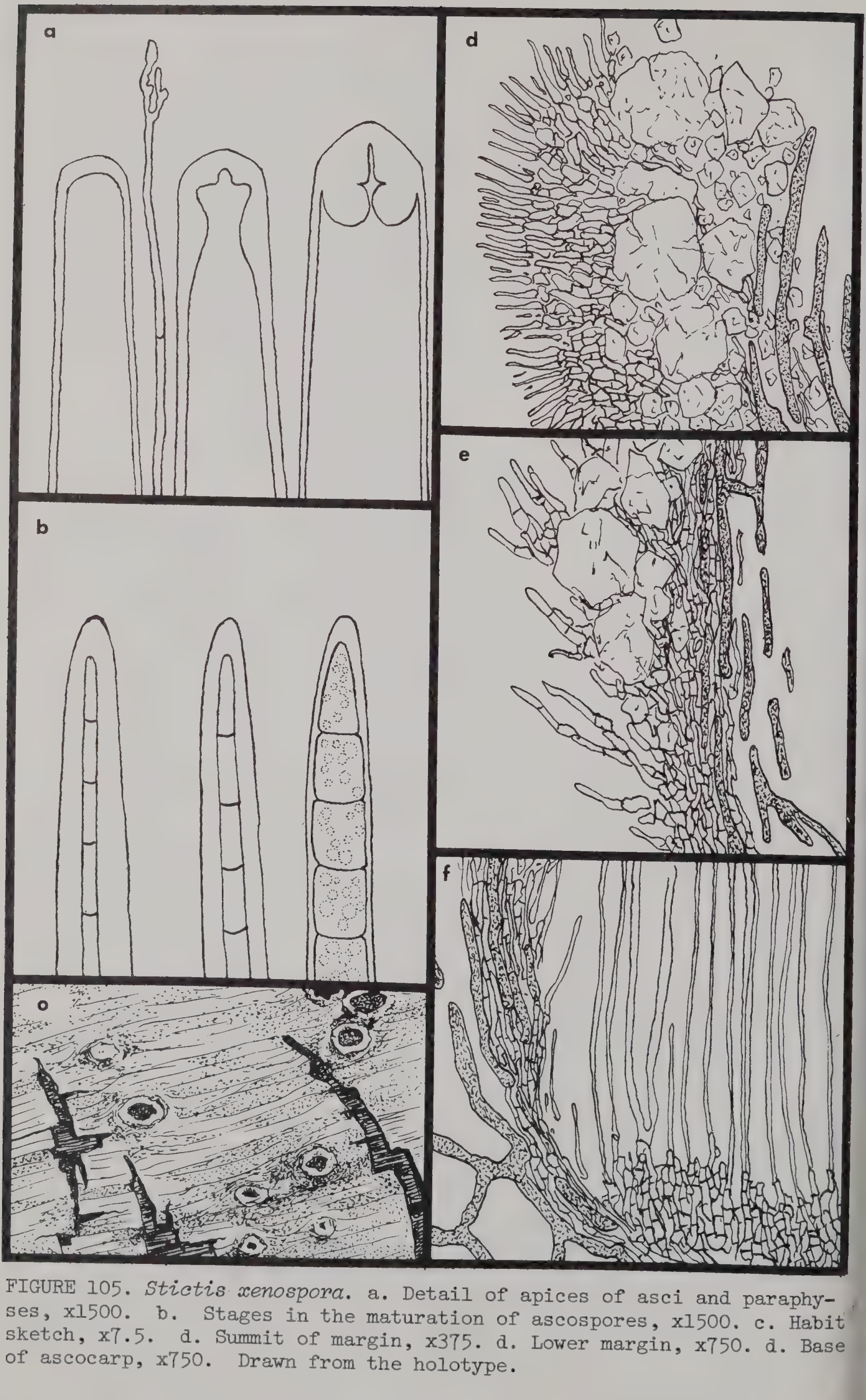

FIGURE 105. *Stictis xenospora*. a. Detail of apices of asci and paraphyses, x1500. b. Stages in the maturation of ascospores, x1500. c. Habit sketch, x7.5. d. Summit of margin, x375. d. Lower margin, x750. d. Base of ascocarp, x750. Drawn from the holotype.

SPECIMENS EXAMINED (see also holotype, above): SOUTH AMERICA: Venezuela (NY-Ve 1031, Parc. Nac. Guatapo, boundary between Edo. Miranda and Guarico, Dumont, Haines & Blanco, 30 June 1971)

SUMMARY

The Ostropales are redefined as a group of predominantly saprophytic, predominantly immersed Ascomycetes characterized by small, discocarpous fructifications interpreted as reduced apothecia consisting only of asci, true paraphyses, and subhymenium surrounded by a margin of vegetative origin. Most members of the group have cylindrical asci with a massive, non-refractive apical thickening pierced by a pore which does not blue in iodine, and cylindrical to filiform, transversely multiseptate ascospores. Muriform spores, and asci which appear bitunicate but lack a functional jack-in-the-box mechanism, occur sporadically throughout the order. The Ostropales are compared with the Phacidiales, Clavicipitales, Helotiales, Graphidales, Patellariaceae, and Gyalectaceae. A close relationship to the Clavicipitales is questioned; the affinities of the group appear to lie with either the Graphidales or the Patellariaceae. The Thelotremataceae are excluded from the Ostropales on the basis of ascospores with lenticular cell lumina and an inner wall which turns red in iodine solutions.

The nomenclature and taxonomy of 88 genera formerly included in the Ostropales or Stictidaceae are reviewed. A key to excluded and included genera is provided. Accepted Ostropalean genera include two new genera, *Acarosporina* and *Lillicoa*; seven genera included by other authors in the Ostropales, *Stictis, Schizoxylon, Ostropa, Robergea, Biostictis, Nanostictis,* and *Conotrema*; and 11 genera not previously accepted as Ostropalean by mycologists, *Propoliopsis, Absconditella, Ramonia, Thelopsis, Gloeolecta, Melittosporiella, Stictophacidium, Propolidium, Delpontia, Odontotrema,* and *Cryptodiscus*. *Vibrissea* and *Acrospermum* are excluded from the order. Revision of the excluded genus *Karstenia,* and redescriptions of accepted genera and their type species, accompany nomenclatoral notes. The final section of the paper consists of an expanded treatment of *Cryptodiscus* (6 spp., 2 new), a revision of *Robergea* (8 accepted species, 3 new), a revision of the North American species of *Schizoxylon,* with notes on extralimital species (19 accepted species, including 8 new combinations and 5 new species), and a comprehensive treatment of *Stictis*. Two hundred and forty-eight species are reviewed. Of these, 49 are accepted; 16 of these are new. Others are reduced to synonymy with accepted species, transferred to other genera, or accepted in genera where they had been placed by other authors.

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RHYTIDOSPORA, A NEW CLEISTOCARPOUS GENUS OF THE MELANOSPORACEAE[1]

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SUMMARY

Rhytidospora is erected as a new genus in the Melanosporaceae. It is characterized by light coloured cleistothecia with a cephalothecoid peridium and one-celled, dark brown, wrinkled ascospores possessing two germ pores. *R. tetraspora* sp. nov. is described and photographed from burro dung collected in Venezuela.

INTRODUCTION

During the course of a continuing study of coprophilous fungi, one apparently undescribed cleistocarpous genus was isolated on Leonian's medium (Cain and Farrow, 1956) mixed with powdered burro dung. The taxon is characterized by light orange cleistothecia with a cephalothecoid peridium; globose to subglobose asci; and one-celled, dark brown, wrinkled ascospores possessing two germ pores. Since no other cleistocarpous genus is known with this combination of characteristics, the taxon is described here as a new genus.

TAXONOMY

Rhytidospora Jeng & Cain, gen. nov.

Ascocarpia dispersa, sine stromate nec ostiolo, globosa vel subglobosa, pallide armeniaca, glabra, e peridio membranaceo, pallide armeniaco, cephalothecoideo composita. Asci unitunicati, iodo non caerulescentes, globosi vel subglobosi, irregulariter dispersi, evanescentes. Paraphyses nullae. Ascosporae unicellulares, primum hyalinae, ma-

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turitate confirmata brunneae vel atro-brunneae, parietibus crassis, rugulosae, foramen germinale in utroque apice exhibentes. Conidia incognita.

TYPUS GENERIS: Rhytidospora tetraspora Jeng et Cain

ETYMOLOGY: Greek, rhytido = wrinkle and spora = seed, referring to the wrinkled wall of the ascospores.

Ascocarps scattered, non-stromatic, non-ostiolate, globose to subglobose, light orange, glabrous; peridium membranaceous, light orange, cephalothecoid in surface view. Asci unitunicate, non-amyloid, globose to subglobose, irregularly disposed, evanescent. Paraphyses lacking. Ascospores one-celled, at first hyaline, brown to dark brown at maturity, thick-walled, wrinkled with two germ pores. Conidia unknown.

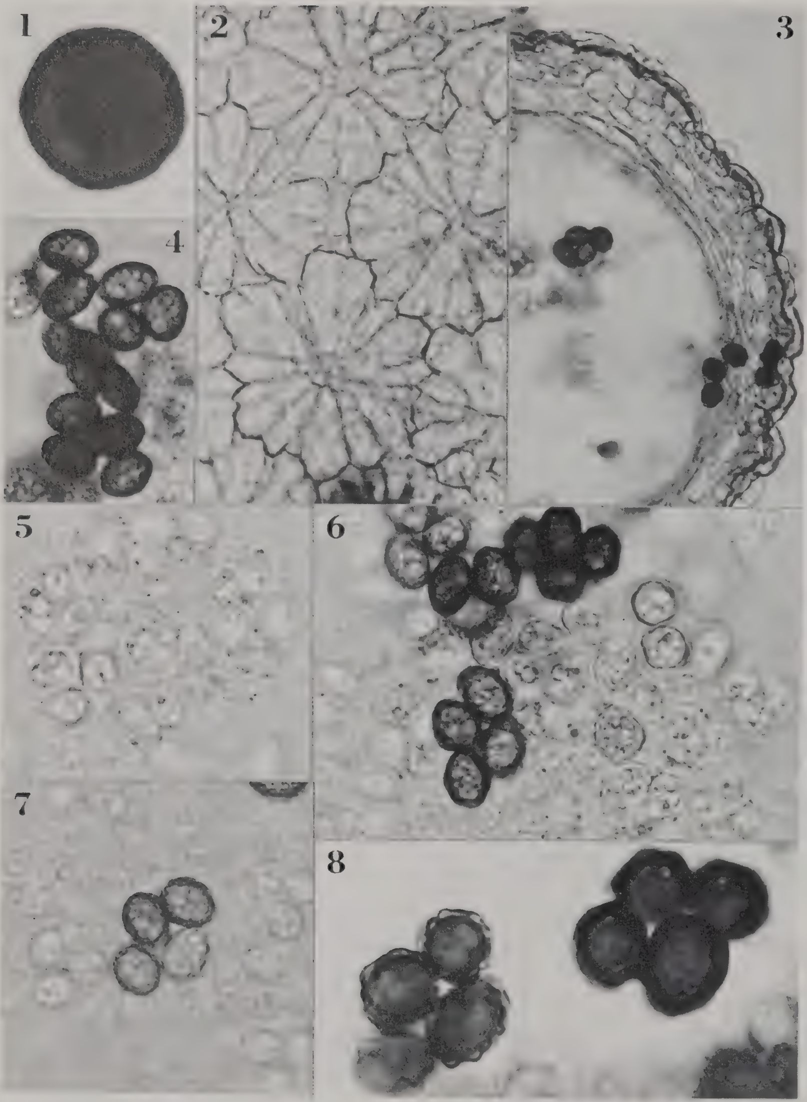
Rhytidospora tetraspora Jeng & Cain, sp. nov. Figs. 1-8.

Ascocarpia dispersa, superficialia, globosa vel subglobosa, 90-150 x 90-135 μm magna, pallide armeniaca, glabra, e peridio membranaceo, translucenti, pallide armeniaco, cephalothecoideo, 30-54 μm crasso, in tribus stratis composita. Asci unitunicati, iodo non caerulescentes, irregulariter dispersi, quadrispori, globosi vel subglobosi, 21-25 x 14-20 μm magni, parietibus tenuibus, evanescentes. Ascosporae unicellulares, ellipsoideae, 10-13 x 7-9 μm magnae, primum hyalinae, deinde pallide brunneae vel olivaceo-brunneae, maturitate confirmata atro-brunneae, parietibus crassis, rugulosae, foramen germinale in utroque apice exhibentes. Conidia incognita.

HOLOTYPUS: in equorum fimo lectus est, in calle a Manacal ad Los Pocitos vocato, in loco ab Irapa septentrionali-occidentali remoto, in Sucre pago reipublicae Venezuelensis, 13 Quint. 1972, Dumont, Cain, Samuels, Morillo et Farfan VE-4890y. In Torontoensis universitatis Cryptogamarum herbario.

ETYMOLOGY: Greek, tetra = four and spora = seed, referring to the number of ascospores in the ascus.

Ascocarps scattered, superficial, globose to subglobose, 90-150 x 90-135 μm, light orange, glabrous; peridium 30-54 μm thick, membranaceous, translucent, cephalothecoid in surface view, 3-layered in section, consisting of an outer layer composed of several regular plates of radiating as well as polygonal cells, light orange, one cell wide,



Figs. 1-8. Rhytidospora tetraspora. 1. Ascocarp. x150. 2. Peridium in surface view. x275. 3. Longitudinal section of the peridium. x275. 4. Mature ascospores. x615. 5. Young asci and ascospores. x615. 6. Young and mature ascospores. x615. 7. Portion of an ascocarp showing one ascus containing four mature ascospores. x615. 8. Mature ascospores showing the wrinkled spore wall and one of the two germ pores. x 1090.

4.5-7.5 µm thick, with flattened and elongated cells filled with light orange homogenous matrix, a middle layer 21-36 µm thick, with angular, thick-walled, hyaline cells measuring 6-36 x 6-12 µm and an inner layer 9-12 µm thick, with flattened and elongated, hyaline cells measuring 5-18 x 2-3 µm. Asci unitunicate, non-amyloid, irregularly disposed, 4-spored, globose to subglobose, 21-25 x 14-20 µm, thin-walled, evanescent. Paraphyses lacking. Ascospores one-celled, ellipsoidal, 10-13 x 7-9 µm, at first hyaline, ranging in color from light brown to olivaceous brown, dark brown at maturity, thick-walled, wrinkled with a germ pore measuring 1.4-1.7 µm in diameter at each end of the spore. Conidia unknown.

HABITAT: on burro dung.

SPECIMEN EXAMINED: VENEZUELA: Edo. Scure: NW of Irapa, trail between Manacal and Los Pocitos, burro dung, 13 July 1972, Dumont, Cain, Samuels, Morillo and Farfan VE-4890y (TRTC).

In a collection from Mexico (TRTC 36559) the ascospores are of the same magnitude as in R. tetraspora but the original notes indicate that the ascus contained only two spores. In the absence of other diagnostic characters and since the material is very scanty, we feel that a final disposition must await further information based on fresh material.

DISCUSSION

Superficially, R. tetraspora resembles the ostiolate Neocosmospora vasinfecta E.F. Smith (Udagawa, 1963), of the Hypocreaceae, in possessing a light coloured peridium and the ornamentation of the ascospores. It differs primarily in having dark ascospores with very distinct germ pores, features not known in Hypocreaceae.

The cephalothecoid peridium in Rhytidospora is quite interesting in that unlike most forms with this peridium type, it consists of several regularly arranged plates. Each plate is composed of a few small polygonal cells in the center which in turn are surrounded by several large radiating cells, each with thickened end walls. The continuation of these walls results in a permanent dehiscence line in each plate. This is the special mechanism in order to split the ascocarps for discharge of the mature ascospores.

Rhytidospora is more similar to some members of Melanosporaceae rather than Hypocreaceae, for example, Melanospora Corda (Doguet, 1955) and Microthecium Corda (Udagawa and Cain, 1969; Hawksworth and Udagawa, 1977), in possessing light coloured ascocarps and brown to dark brown ascospores with conspicuous terminal germ pores. It is apparent from such criteria that Rhytidospora belongs in the Melanosporaceae but differs from the other genera in its unique peridial structure and the characteristic ascospore ornamentation.

As pointed by Cain (1956), the production of globose to subglobose, evanescent asci and their irregular disposed arrangement within the ascocarp peridium, the absence of paraphyses; and the presence of peridial plates provides a typical example of progressive evolution from an ostiolate form. R. tetraspora may represent another example of this principle.

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ANOTHER GENUS OF THE GYMNOASCACEAE WITH SWOLLEN SEPTA ON PERIDIAL ELEMENTS

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Summary

A new genus of the Gymnoascaceae *(Macronodus)* is described and compared with related genera. A key to *Macronodus* and the species of *Auxarthron* is provided.

The genus *Auxarthron* Orr and Kuehn was established in 1963 (15) to accommodate gymnoascaceous species previously assigned to the genera *Myxotrichum* Kunze and *Gymnoascus* Baran. Ascocarps of *Auxarthron* are netlike as are numerous other Gymnoascaceae, but have characteristic swellings at most septa of the peridial elements. Ascospores are pale yellow or brown, spherical to oval and asperulate-reticulate. Species are separated on coloration of the ascocarp and the nature of the appendages on them.

Since 1963, one new species *(A. pseudauxarthron)* lacking the characteristic swollen septa has been described (14).

Reference has been made in several recent studies of keratinophilic fungi to species of *Auxarthron*, which were not specifically identified (3, 4, 6, 7, 19). Cultures of these fungi were obtained, and examination of them indicated that several strains represent a new genus of the Gymnoascaceae. This genus, like some others of this family, possesses swollen peridial septa. A key to these related genera follows.

KEY TO GENERA OF GYNMOASCACEAE WITH SEPTAL SWELLINGS ON PERIDIAL ELEMENTS

A. Gymnothecia dark colored..................*Tripedotrichum*

AA. Gymnothecia light colored...............................B

B. Gymnothecial appendages ctenoid or pectinate...........C

BB. Gymnothecial appendages otherwise.......................D

C. Gymnothecial type elements surrounding a cellular cleistothecium enclosing the asci and ascospores, appendages ctenoid.....................................*Ctenomyces*

CC. Gymnothecia netlike, elements surrounding free asci and ascospores, appendages pectinate..........*Pectinotrichum*

D. Swellings at septa regularly present resembling swollen joints..E

DD. Swellings at septa infrequent, not resembling swollen joints..*Gymnoascus*

E. Ascospores ovoid to globose, asperulate-reticulate..*Auxarthron*

EE. Ascospores ovoid to ellipsoid, smooth..........*Macronodus*

The term gymnothecium, as suggested by Novak and Galcoczy (9), is used here since ascocarps produced by most Gymnoascaceae are not cellular cleistothecia, but open netlike structures. Asexual spores are called arthroaleuriospores as defined by Orr et al. (16) and confirmed by Kwon-Chung (10) and Sun and Huppert (23).

MACRONODUS ORR, GEN. NOV.

Gymnothecia discreta, plus minus globosa, appendiculata, saepe confluentia, flavidula vel brunneola, elementis septatis fere tumidis ad septa, anastomosantibus et reticulum efformantibus, asperulatis; appendices bigeneris: elongatae uncinatae vel bifurcatae, breves glabrae; asci globosae vel ovoidei, hyalini evanescentes, octospori; ascosporae globosae, ovoideae vel ellipsoideae flavae usque aurantiacae; status asexulis in forma arthroaleuriosporarum; hyphae ampulliformes praesentes.

Species typicus: *Macronodus bifurcatus* Orr

Gymnothecia discrete, more or less globose, appendaged, often confluent, yellowish to brownish. Elements of the gymnothecia septate, usually enlarged prominently at the septa, anastomosed to form a reticulum, asperulate. Appendages of two kinds; elongate, uncinate or bifurcate, and short, smooth. Asci globose or ovoid, hyaline, evanescent, 8-spored. Ascospores globose, ovoid or ellipsoid, walls smooth, yellow to orange. Asexual state represented by arthroaleuriospores. Ampulliform (racquet) hyphae present.

Macronodus bifurcatus Orr, sp. nov.

Fungus homothallicus; gymnothecia globosa, appendicibus exclusis, 185-670 (890) μm diam, flava usque aurantio-flava vel brunneola, elementis septatis fere ad septa, anastomosantibus et reticulum efformantes, asperulatis; appendices bigeneres: 1) elongatae, gymnothecio concolores, glabrae, plerumque bifurcatae, 300-785 μm longae; et 2) breves simplices glabrae, 5-45 μm longae; asci globosi 4.7-8.2 μm diam vel ovoidei 4.7-7.7 x 5.6-6.9 μm, hyalini evanecsentes octospori; ascosporae flavidulae vel aurantio-flavae glabrotunicatae, globosae 1.9-3.1 μm; status asexualis in forma arthroaleuriosporarum 2.3-6.1 x 1.9-2.9 μm; hyphae ampulliformes praesentes sed non cum gymnothecia consociatae.

Typus: in solo, Mission, Kansas, U. S. A.

Fungus homothallic. Gymnothecia more or less spherical 185-670 (890) µm diam, excluding the appendages, yellow, orange-yellow or brownish. Elements of the gymnothecium usually prominently enlarged at the septa, anastomosing to form a reticulum, asperulate. Appendages of two kinds: 1) elongate, of the same color as the gymnothecial elements, smooth, usually bifurcate, 300-785 µm long, and 2) short, simple, smooth, 5-45 µm long. Asci globose, 4.7-8.2 µm diam or ovoid 4.7-7.7 x 5.6-6.9 µm, hyaline evanescent, 8-spored. Ascospores pale yellow or orange-yellow, smooth, walls thick, globose, 2.3-3.1 µm diam or ovoid to ellipsoid, 2.3-3.4 x 1.9-2.6 µm. Asexual state represented by hyaline, usually cylindrical arthroaleuriospores, 2.3-6.1 x 1.9-2.9 µm. Racquet hyphae present, not associated with the gymnothecia.

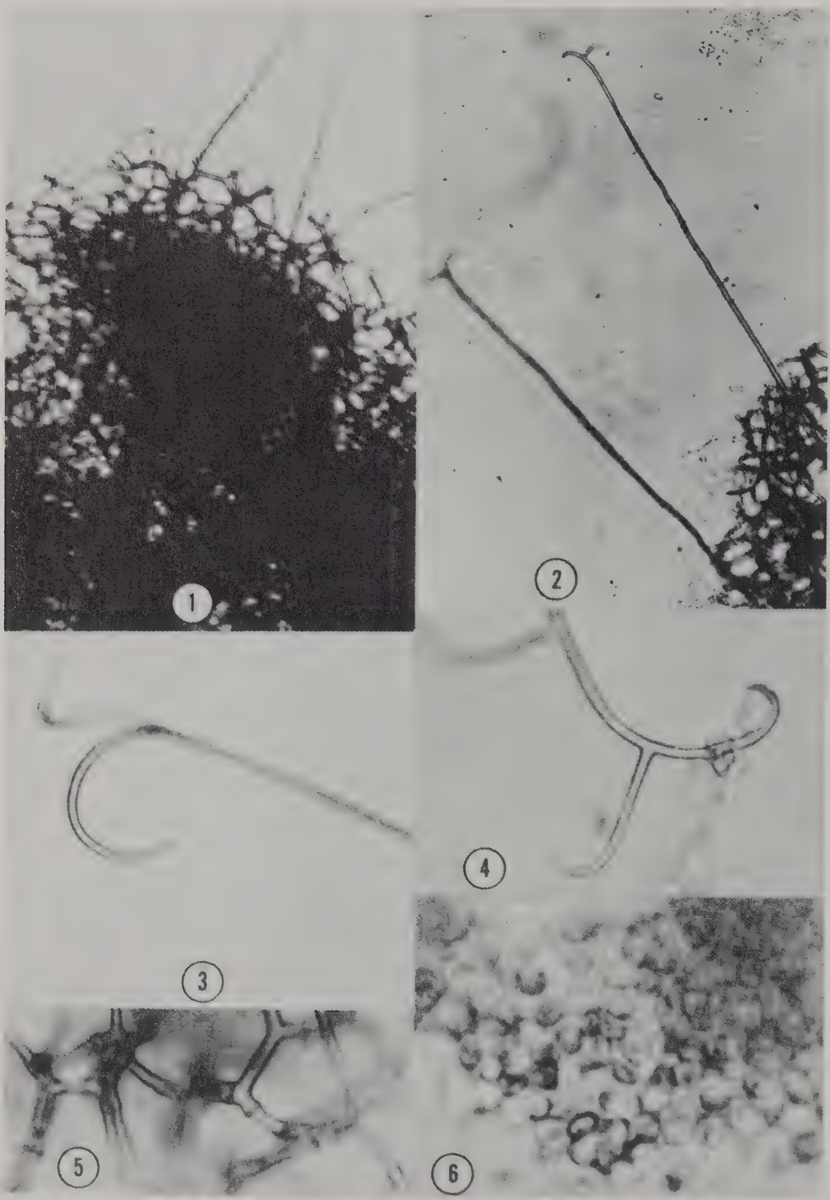
Type strain (desiccated): 0-3750, deposited in the New York Botanical Garden, Bronx, New York 10458, U. S. A.

Material examined: 0-1236 (GR-62, ATCC 32462), soil associated with a horn of an animal, Jankia, India; 0-1259 (NRRL 6081, ATCC 32463), soil, Inyokern area, California, U. S. A.; 0-3153 (Rees F 91, ATCC 32464), feathers of a domestic fowl, Queensland, Australia; 0-3750 (NRRl 6155, ATCC 32465), soil, Mission, Kansas, U. S. A. Representative cultures (desiccated) have been deposited in the New York Botanical Garden, Bronx, New York; Plant Pathology Herbarium, Cornell University, Ithaca, New York; Farlow Herbarium, Harvard University, Cambridge, Massachuetts. Additional material examined: E 21, E 25, E 91 from soil, Etna, Italy, reported by Caretta and Piontelli (3) as a species of *Auxarthron*. 539A from the nest of *Carduelis cannabina* L., Voltice, Southern Moravia, Czechoslovakia, reported by Hubalek (6, 7) as a species of *Auxarthron*. These isolates, however, represent strains of *Malbranchea* possessing free uncinate appendages and have been reported previously by Emmons (5). A study of this genus and related fungi and their relation with sexual states has been made by Sigler and Carmichael (22).

Colonies of *M. bifurcatus* on Freezing agar (8), Oatmeal-Salts agar (18), and corn meal agar attain a diameter of 75-80 mm in 18-25 days at 22-25°C. They are at first pasty and white, becoming yellowish and finally orange to orange-brown. At maturity, such colonies resemble those of *Auxarthron zuffianum* (Morini) Orr & Kuehn, *A. umbrinum* (Boudier) Orr & Plunkett, and *A. conjugatum* (Kuehn) Orr & Kuehn (15). The reverse of some colonies is orange, but neither exudate or odor was observed.

Like many other Gymnoascaceae, *M. bifurcatus* produces asci through the intervention of croziers. Croziers arise from initials produced from the same or different parent hyphae. One initial coils about the other, and from this situation arise the croziers that produce the gymnothecia, asci, and ascospores.

Gymnothecia of *M. bifurcatus* are quite similar to those of *Auxarthron* in being netlike (Fig. 1) with enlargements or swellings at the septa on the peridial elements (Fig. 2). Short appendages of this species are also similar to those of *Auxarthron*, except those of the



FIGS. 1-6. *Macronodus bifurcatus*. 1. Gymnothecium showing netlike appearance x 450. 2. Gymnothecium with elongate bifurcate appendages. x 100. 3. Tip of appendage with bifurcate hooks. x 450. 4. Tip of elongate appendage with hooked branch below tip. x 950. 6. Ascospores. x 1000.

acutely pointed ones of *A. zuffianum* or the abortive ones of *A. umbrinum* (15). The elongate appendages of *M. bifurcatus*, however, differ from those of species of *Auxarthron* in being bifurcate (Figs. 2 & 3). Occasionally, some appendages on gymnothecia of *M. bifurcatus* are branched in a hook-like fashion below the bifurcate apex (Fig. 4). This branch gives a trifurcate appearance to some gymnothecia. DeVroey (4) reported the isolation of a species of *Auxarthron* from soil from Rwanda and provided an illustration. There is little doubt that his isolate also represents a strain of *M. bifurcatus*.

Bifurcation of appendages of *Auxarthron* has been reported for a strain (0-261) of *A. brunneum* (Rostrup) Orr & Kuehn (15). This strain was later determined to be *A. thaxteri* (Kuehn) Orr & Kuehn (13). In subsequent examinations of this strain over a period of years, I have not observed any bifurcate appendages. It is apparent that this condition is not common in species of Gymnoascaceae.

Although swollen peridial elements may sometimes be present in some species of *Gymnoascus* as pointed out by Apinis (1) and Samson (21), they are not the same type as those found in *Ctenomyces*, *Auxarthron* or *Macronodus*, nor are they as consistently present in *Gymnoascus* as they are in the genera noted above. Other genera with similar swellings are noted in the key to such genera earlier. Such swellings have been reported as somewhat resembling swollen "knuckle-joints" (15).

Ascospores of *M. bifurcatus* also differ from ascospores of species of *Auxarthron* in being circular in face view and ovoid to ellipsoid in longitudinal view. Furthermore, ascospores of *M. bifurcatus* are smooth (Fig. 6). Species of *Auxarthron* produce spherical to oval, ascospores which appear echinulate-reticulate and resemble the ascospores of some species of *Amauroascus* Schroeter (2). Ascospores of *M. bifurcatus* closely resemble those of species of *Gymnoascus*, *Gymnascella* Peck (18), *Arthroderma* Berkeley and *Nannizzia* Stockdale. Ascospores of the latter two genera were determined to be oblate spheroids by Padhye and Carmichael (19).

Perhaps, *M. bifurcatus* represents an intermediate species between *Auxarthron* (15) and *Gymnoascus* (17) on the one hand or between *Auxarthron* and *Pectinotrichum* Varsavsky & Orr (24) and *Ctenomyces* Eidam (11) on the other.

Apinis (1), Emmons (5), and Samson (21) have observed that species of *Auxarthron* are closely related, but they have not indicated precisely how close this relationship might be or just how species should be separated. Undoubtedly, *Macronodus* is closely related to *Auxarthron*. A key to *Macronodus* and species of *Auxarthron* follows.

KEY TO MACRONODUS AND SPECIES OF AUXARTHRON

A. Ascospores discoid-oblate, gymnothecial appendages bifurcate..........................*Macronodus bifurcatus*

AA. Ascospores spherical to ovoid, asperulate-reticulate, gymnothecial appendages other than bifurcate.*Auxarthron*..B

B. Gymnothecial elements lacking swollen septa..*A. pseudauxarthron*

BB. Gymnothecial elements with swollen septa................C

C. Gymnothecia with short appendages only..................D

CC. Gymnothecia with short and long appendages..............E

D. Appendages acutely pointed...................*A. zuffianum*

DD. Appendages blunt or rounded................*A. reticulatum*

E. Gymnothecia brown; swollen septa prominent.....*A. thaxteri*

EE. Gymnothecia orange or orange-brown......................F

F. Appendages uncinate, frequently branched below the uncination.................................*A. californiense*

FF. Appendages uncinate, coiled or bent, rarely branched.....G

G. Gymnothecia with short compact elemental units; appendages equal in length to the diameter of the gymnothecium...*A. compactum*

GG. Gymnothecia of varying length...........................H

H. Gymnothecia with elongate and/or abortive appendages...*A. umbrinum*

HH. Gymnothecia lacking abortive appendages......*A. conjugatum*

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AQUATIC FUNGI OF SCANDINAVIA: PETERSENIA IRREGULARE

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SUMMARY

A tubular, irregular, branched, or lobed thallus segments to form sporangia which may then disarticulate. Resting spores develop endogenously, but the enclosing thallus wall disintegrates after these cells mature. *Petersenia irregulare* has morphological affinities with the Sirolpidiaceae and Lagenidiaceae, but is retained in the Olpidiopsidaceae pending discovery of resting spore types in the other members of the genus.

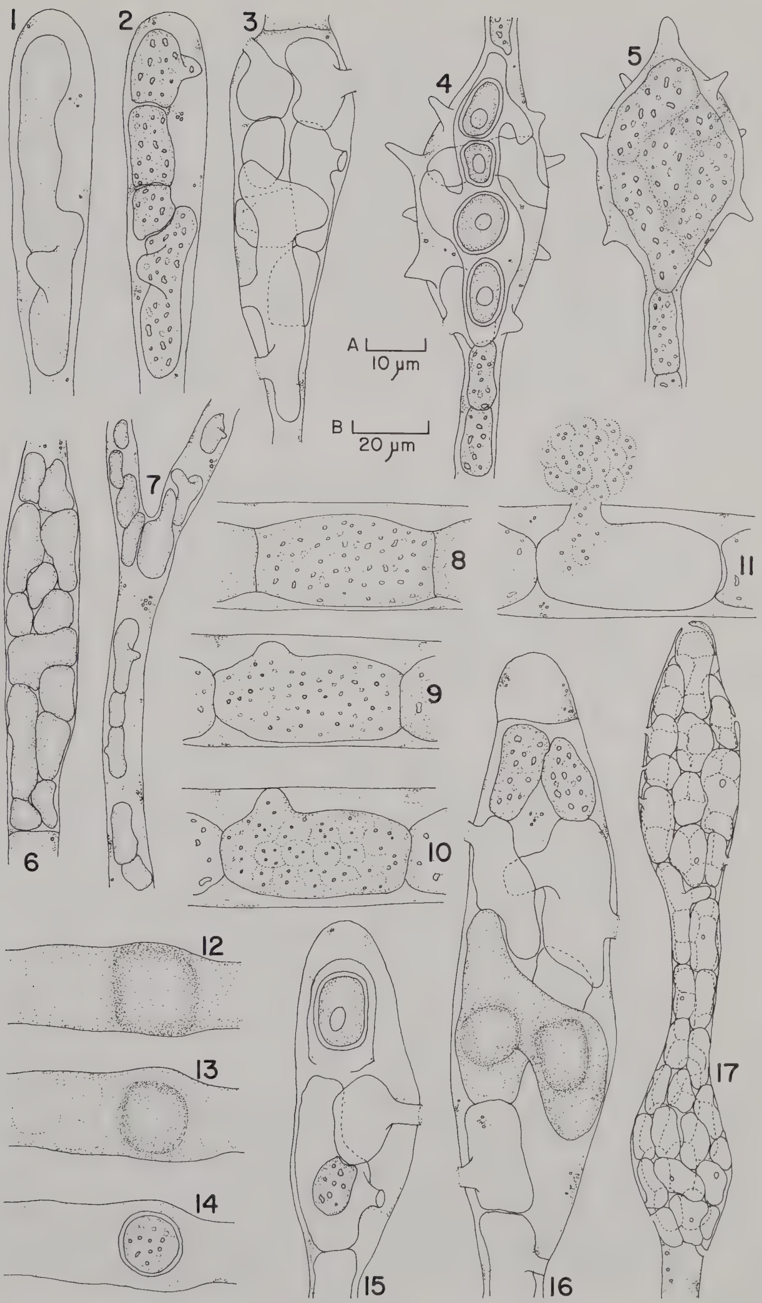
Constantineanu (1901) reported two zoösporic fungi parasitic in an unidentified *Saprolegnia: Olpidiopsis saprolegniae* (Braun) Fischer, and a new species, doubtfully assigned to *Olpidiopsis, O. irregularis.* He also reported *Pseudolpidium saprolegniae* (Braun) Fischer in another unidentified species of *Saprolegnia*, thus retaining two names for what is now (Sparrow, 1960) accepted as a single taxon, *O. saprolegniae* var. *saprolegniae* Cornu (1872).

In 1943, Sparrow removed *Olpidiopsis irregularis* Constantineanu from Cornu's (1872) genus, and placed it in *Petersenia* (as *P. irregulare*). The irregular nature of the sporangia in Constantineanu's fungus, a characteristic inconsistent with the usual configuration of the asexual stage in species of *Olpidiopsis*, was cited to justify this change. Sparrow noted, however, that *P. irregulare* might have to be removed from *Petersenia* when the resting spores were discovered and characterized.

Petersenia irregulare evidently has been reported few times since its discovery in Rumania. Sparrow collected the fungus as an endoparasite of unidentified species of *Achlya* in Denmark (1934) and in Michigan (1960); Höhnk (1960) found the species in Iceland, but gave no descriptive details. Milanez and Val (1969) noted the occurrence of the organism in Brazil. I have recovered *P. irregulare* in *Achlya treleaseana* (Humphrey) Kauffman from two sites in Sweden. The host and its parasite were collected on halves of hempseed baited in water (and bits of debris) expressed from mats of *Sphagnum* spp.: Vadbacka (59°50'10"N, 17°31'05"E), west of Uppsala, 3-VIII-76, Herb. No. 13464; Rodvatten (58°04'N, 12°02'30"E), north of Göteborg, 9-VIII-76, Herb. No. 13648. This paper is an account of the development and structure of these specimens, together with comments on the taxonomy of the species. Voucher specimens are deposited in the collections of the Institute for Systematic Botany, University of Uppsala.

Stages in the development of *Petersenia irregulare* were observed in the gross cultures, and subsequently (by inoculation) in a single-hypha isolate of *Achlya treleaseana* collected at Vadbacka. Infected colonies of *A. treleaseana* from gross culture were placed, together

FIGS. 1-17. *Petersenia irregulare.* 1. Small, immature thallus in hyphal tip. 2. Segmentation of thallus into sporangial rudiments. 3. Discharged sporangia. 4. Endogenous resting spores, and discharged sporangia in an intercalary oögonial initial. 5. Segmentation of a thallus in a terminal oögonial initial. 6, 7. Immature sporangia showing variations in shape and density. 8-11. Stages in sporangium maturation and planont discharge. 12-14. Stages in endogenous cleavage of a resting spore. 15. Resting spore with partially disintegrated thallus wall. 16. Segmented thallus walled off below invaded hyphal tip; two incipient resting spores. 17. Discharged sporangia in a hyphal tip. Figures 6, 7, 17, scale A; others, scale B.


A 10 µm
B 20 µm

with uninfected specimens, in Petri plates containing 40 ml of filtered (through 1 cm absorbent cotton), unsterilized acid bog water from Vadbacka. Infection occurred in such cultures, but never when the invaded and uninvaded plants were incubated together in sterile, charcoal-filtered, distilled water. I was unable to establish bacterial-free, two-member cultures by transferring single infected hyphae of *A. treleaseana* onto agar. The host grew well on the usual isolation medium for watermolds (corn meal agar), but when transferred back to hempseed in water culture, was free of the parasite. I did not attempt to infect other watermolds with the *Petersenia* because it did not survive repeated transfer.

STRUCTURE AND DEVELOPMENT

Planonts from sporangia of *Petersenia irregulare* settle on hyphae of *Achlya treleaseana*, and put into the host a slender penetration peg. I assume that the content of the settled spore is discharged into the host hypha, but I did not observe this event.

The first visual evidence of infection is the appearance in the host hyphae of tubular, irregular, lobed, or branched, stout filaments (Fig. 1). If infection occurs in an oögonial initial, the parasite forms a large, ovoid to broadly ellipsoidal thallus that nearly fills the oögonial cavity (Fig. 5). At first, the thallus of *Petersenia irregulare* is vacuolate (Fig. 1), but as it begins to cleave into sporangia, the large vacuoles disappear, and many conspicuous, irregular or spherical refractive bodies (Figs. 2, 5) appear in the cytoplasm. Sporangia are formed (Figs. 2, 5) as irregular or cylindrical thallus segments (of greatly varying size). The incipient sporangia tend to disarticulate (Fig. 2) shortly after they are delimited. Sporangium shape is in part dictated by whether or not the segmenting thallus fills the host hypha or induces hypertrophy (Fig. 6). Some parasitized hyphae are not distended, and the sporangia of the *Petersenia* are somewhat scattered (Fig. 7). Invaded hyphae of the host may (Figs. 3, 6) develop crosswalls at points along their length.

Sporangium maturation (Figs. 8-11) begins with the evagination of a broad papilla (Fig. 9) that is the incipient discharge tube. In some exceptionally elongate sporangia, two exit tubes are formed (Fig. 3). The large, refractive bodies in the cytoplasm seem to fragment(?) into smaller, spherical globules (Fig. 9) concurrently with exit tube formation, such that 1-3 shiny globules appear in each planont. The spores are cleaved endogenously (Fig. 10), and at release, flow out quickly through the exit tube orifice to cluster momentarily in a spherical mass (Fig. 11). Within minutes after release, the extruded group of spores breaks up, and laterally biflagellate planonts swim away. The anterior flagellum is slightly longer than the trailing one, but the spore is certainly not as strongly heterokont as those of plasmodiophoraceous fungi. Indeed, the flagella may in fact be equally long with one so closely appressed to the spore body along a part of its length that it appears to be shortened. Nomarski interference optics have not been helpful in determining flagellar length and insertion. In very foul cultures, the sporangial protoplast may begin cleavage endogenously, but complete segmentation into spores exogenously. Emptied sporangia often give an irregular net-like appearance to heavily invaded hyphae (Fig. 17).

Resting spores are formed endogenously within some thallus segments (Figs. 4, 16). At the site of resting spore development the cytoplasm of a portion of the invading thallus becomes densely congregated (Fig. 12). That portion of the cytoplasm of the parasite not involved in resting spore formation remains diffuse and vacuolate. The incipient resting cell contracts, becomes successively more dense (Fig. 13), and subsequently develops a thick wall (Fig. 14). A single, large, refractive body (Figs. 4, 15) ultimately appears, and the resting spore is assumed at this point to be mature. The resting spore may be spherical, ellipsoidal, or short cylindrical (Figs. 4, 15); after it has matured, the confining wall of the thallus disintegrates (Fig. 15). In thallus segments where a number of resting spores are produced in a scattered linear fashion, the cells appear as a loose chain of thick-walled structures free in the host hypha. Their germination has not been observed.

TAXONOMY

Petersenia irregulare exhibits structural parallelisms with two families of biflagellate fungi other than the Olpidiopsidaceae where it has been assigned by Sparrow (1960). Constantineanu's fungus is in any case not a species of Olpidiopsis, as surmised correctly by Sparrow (1943), and as is borne out by the structure of its resting spores. Chiefly to be decided is whether or not *P. irregulare* should be removed from *Petersenia* and deposited elsewhere as Sparrow predicted might be necessary.

The tubular nature of the thallus, and its segmentation into sporangia which may or may not disarticulate, are characteristics not far removed from those of members of the Sirolpidiaceae. For example, the thallus of *Petersenia irregulare* fragments into sporangia in a fashion seemingly identical to the developmental pattern of *Pontisma lagenidioides* Petersen in species of *Ceramium* (Sparrow, 1934). Karling (1942), in fact, excluded *Petersenia* from the Olpidiopsidaceae precisely because of the striking resemblance of its species to *Sirolpidium* and *Pontisma* (he retained the name applied by Constantineanu: *Olpidiopsis irregularis*). Resting spores have not been demonstrated in members of either of the two genera (Sparrow, 1960) of the Sirolpidiaceae, hence a meaningful comparison of *Petersenia irregulare* with representatives of this family is not possible currently.

While the thallus of *Petersenia irregulare* resembles superficially some of the more intricate forms of *Myzocytium* Schenk (in the Lagenidiaceae), the pattern of sexuality in members of Schenk's genus would seem to exclude *P. irregulare* from a position there. The irregular, refractive bodies in the cytoplasm of *P. irregulare* are very much like those in species of *Lagenidium* Schenk. Moreover, the multiplicity of sporangia produced by *P. irregulare* is a parallel to the structure of some taxa of *Lagenidium*. A few representatives of this large genus form resting spores parthenogenetically — *L. parthenosporum* Karling, and *L. entophytum* (Pringsheim) Zopf, to name two — and the similarity of resting spores in *P. irregulare* to those in *L. destruens* Sparrow (1950) is unmistakable. The thallus fragments into sporangia in the *Petersenia*; it does not do so in Sparrow's species. Certainly the fact that the planonts of *P. irregulare* are formed endogenously would not exclude it from *Lagenidium*.

Were one inclined to do so, *Petersenia irregulare* could be incorporated readily into *Lagenidium* or *Pontisma*. The resting spores of other species of *Petersenia* have not been discovered, and to remove *P. irregulare* because it has such structures would assume without evidence that the other taxa in the genus have quite different resting spores. Constantineanu's fungus is accommodated easily within the established limits of *Petersenia* even though all members of that genus are incompletely known. I believe the species should be retained in *Petersenia*, and that taxon kept in the family to which Sparrow assigned it. To do otherwise, based on the scanty information at hand, could likely result only in ineffectual shuffling.

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MYCOTAXON

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STUDIES IN THE LICHEN FAMILY PHYSCIACEAE. I
A NEW NORTH AMERICAN SPECIES

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Physcia adiastola Essl., sp. nov. Figure 1

Physcia rubropulchra subsimulans sed sporis minoribus et medulla nonpigmentosa (sine skyrin) differt.

Thallus greenish gray to dark gray or brownish, up to 6 cm or occasionally 10 cm in diameter, orbicular to irregular or at times pulvinate. Lobes irregularly to dichotomously branched, more or less linear, (0.3-) 0.5-1.5 (-3) mm broad, flat or often concave, especially at the frequently upturned tips. Sorediate, the soralia irregular to occasionally weakly capitate, largely terminal and marginal (occasionally also laminal); soredia coarsely granular to isidioid and often becoming loosely agglutinated into piles, (40-) 60-90 (-120) µm in diameter, concolorous with the thallus to slightly paler or distinctly darker. Lower surface black, often paler on the lobe-ends, with numerous long black (sometimes white-tipped) rhizines, these frequently visible from above along the lobe margins and/or the often upturned lobe ends. Apothecia occasional, to 3 mm in diameter, often with rhizines around the base; spores (15.5-) 17-22.5 (-25) x 6-9.5 µm, of the typical Physcia type (i.e., with angular lumina that are generally as broad or broader than long). Both the upper and lower cortices are paraplectenchymatous and leptodermatous.

Type: U.S.A. Virginia. Page Co.: ca. 0.5 mi. S of Hazeltop Ridge Overlook at mile 54.9 of Skyline Drive, ca. 3300-3400 ft. elev., *Esslinger 4723* (US, holotype; DUKE, herb. Esslinger, isotypes). No further specimens will be

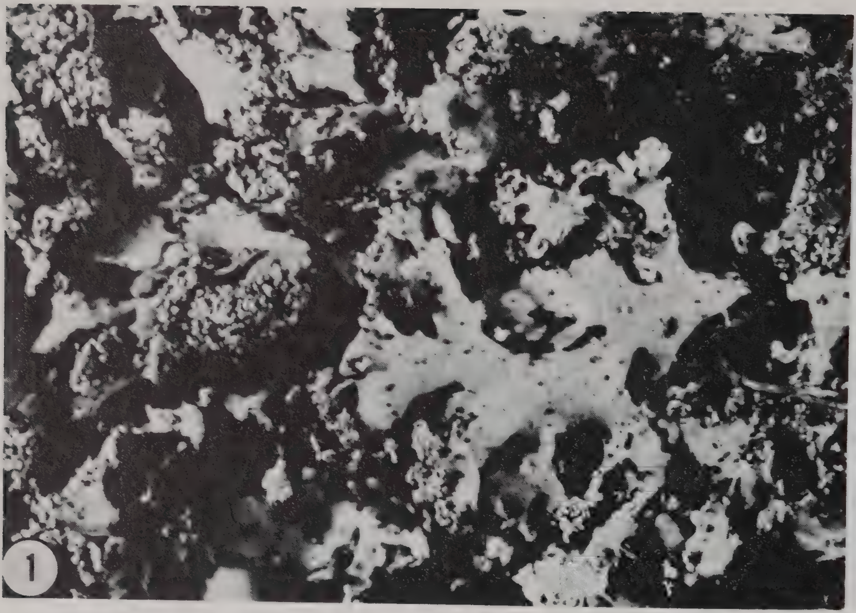
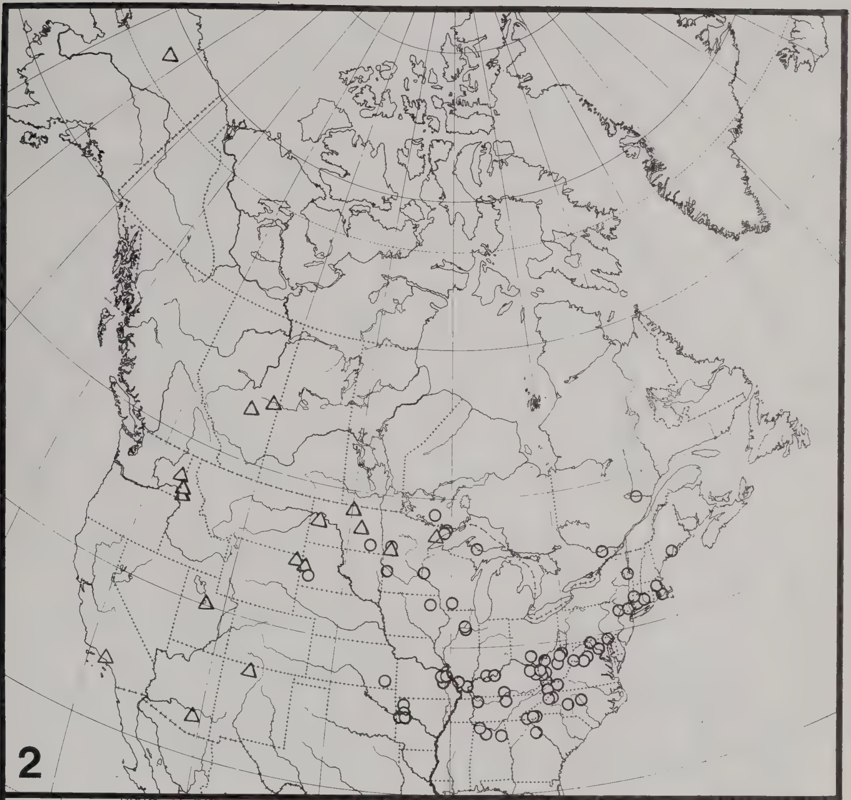


Figure 1. A small portion of the holotype of *Physcia adiastola*, X10.

cited. The data in Table II and the distribution maps (Figs. 2 & 3) are based on the examination of more than 500 specimens, 87 of which are *Ph. adiastola*. All the specimens examined are located in US, DUKE, FH, and my personal herbarium.

TAXONOMY

For many years this new species has been confused with *Ph. orbicularis* (Neck.) Poetsch, a species described from Europe and which appears to be primarily a western species in North America (Fig. 2). *Physcia adiastola* is distinguished from that species by its usually more linear lobes and its coarsely granular to isidioid soredia which are located largely in irregularly delimited marginal or terminal soralia. *Physcia orbicularis* has more finely granular soredia (Table I) located in round to irregular, laminal and submarginal soralia and, although variable, it generally has shorter and more rounded lobes. Also, although there is a broad overlap, the spores of *Ph. orbicularis* average somewhat larger than those of *Ph. adiastola* (Table I).



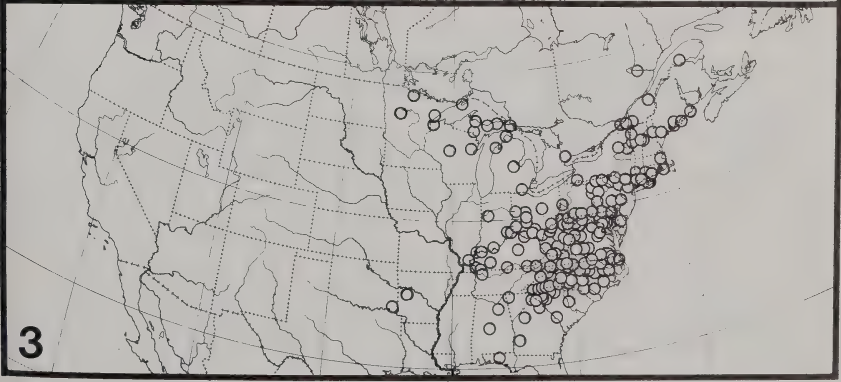


Figure 2. Distribution of *Ph. adiastola* (○) and North American distribution of *Ph. orbicularis* (△).
Figure 3. North American distribution of *Ph. rubropulchra*.

TABLE I

A comparison of three species in the *Ph. orbicularis* group with regard to several taxonomically useful characters.

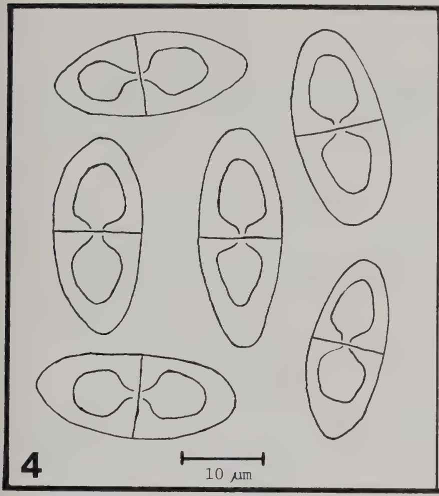
	Ph. orbicularis	*Ph. adiastola*	*Ph. rubropulchra*
Size of soredia, in µm's	(30-)40-60(-75)	(40-)60-90(-120)	(30-)40-80(-90)
Spore type	Physcia	Physcia	Pachysporaria
Size of spores, in µm's	(17-)20-25(-28) x 8-11	(15-)17-23(-25) x 6-9.5	(21-)24-31(-34) x (9-)10-14(-16)
Medulla color	white	white	red

Another similar species is *Ph. rubropulchra* (Degel.) Moberg (Moberg, 1975). Although very similar to *Ph. adiastola* in lobe configuration and soredial size (see Table I) and placement, *Ph. rubropulchra* differs markedly by its red medulla and its larger, Pachysporaria type spores (i.e., spores in which the lumina soon become rounded and are usually as long or longer than they are broad, see Fig. 4). The spores of *Ph. adiastola* are of the Physcia type,

TABLE II

Substrate preferences of *Ph. rubropulchra* and *Ph. orbicularis*. The number of specimens from each substrate as well as the percentage of the total it represents is given.

Substrate	*Ph. rubropulchra* 334 total	*Ph. adiastola* 87 total
Bark - hardwoods	299 (89.5%)	13 (14.9%)
- conifers	8 (2.4%)	0
Mosses - over rock	10 (3%)	58 (66.7%)
-over bark	11 (3.3%)	6 (6.9%)
Rock	5 (1.5%)	10 (11.5%)



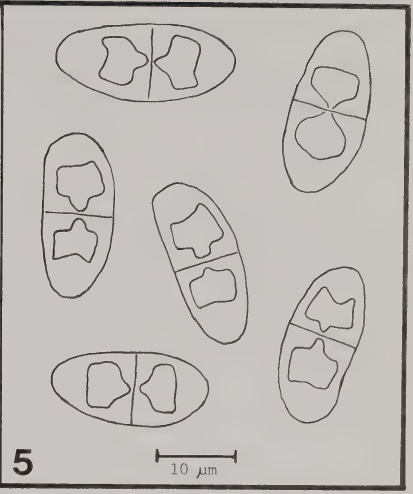


Figure 4. Pachysporaria type ascospores of *Physcia rubropulchra*.
Figure 5. Physcia type ascospores of *Physcia adiastola*.

with angular lumina which tend to be broader than they are long (Fig. 5). These differences are underscored by the very different substrate ecologies of the two species. As indicated by the data presented in Table II, *Ph. rubropulchra* has been collected most frequently from the bark of hardwoods (89.5% of the 334 specimens examined). *Physcia adiastola*, on the other hand, although also collected from hardwood bark (14.9%), occurs far more commonly over mosses on rock (66.7%) or on bare rock (11.5%). The two species are largely sympatric in eastern North America although *Ph. adiastola*, unlike *Ph. rubropulchra*, seems to be absent from the Atlantic and Gulf coastal plains (Figs. 2 & 3). *Physcia adiastola* is unknown outside of North America but *Ph. rubropulchra* was recently reported for Japan (Kashiwadani, 1975).

Specimens of *Ph. adiastola* growing directly on rock tend to be more orbicular with narrower, less imbricate lobes and with the rhizines more visible along the sides of the lobes. Such specimens are also often darker colored with darker soredia and have occasionally been mistaken for *Ph. sciastra* (Ach.) DuRietz, a dark, saxicolous species differing by its smaller thalli, narrower lobes, and its possession of isidia instead of soredia.

CHEMISTRY

Specimens for analysis by thin-layer chromatography (TLC) were selected from throughout the species range. The techniques used were essentially those outlined by Culberson (1972).

The taxonomic or systematic utility of chemistry in the genus *Physcia* is far below that of many other groups of macrolichens, particularly, for instance, the members of the lichen family Parmeliaceae. Relatively few depsides and depsidones, the two classes of substances most commonly found useful in other groups, are found in the Physciaceae. With the exception of the nearly ubiquitous substance atranorin, these compounds are apparently absent from the genus *Physcia*. In those members of the genus *Physcia* under consideration here (the *Ph. orbicularis* group), even atranorin is absent (or present only in very low, trace amounts; see Kashiwadani, 1975). In fact the only substances that have proven taxonomically useful in this group are the anthraquinones. Several species pairs exist in which one major difference between the members of a pair is the production by one member of the anthraquinone skyrin (in the medulla) and its absence from the other member. *Physcia rubropulchra* (with skyrin) and *Ph. adiastola* (without skyrin) are such a pair although morphological differences (discussed above) separate them as well. In addition to skyrin, *Ph. rubropulchra* sometimes contains trace amounts of unidentified compounds including several quinonoid pigments.

As pointed out by Kashiwadani (1975), orange-red pigments previously reported from this group as erythrin or parietin can probably be considered to be skyrin. The same is also true for all or most literature reports of rhodophyscin, a substance of unknown structure reported from *Physcia* and *Parmelia* (see Culberson, 1969). Whether or not the original material named by Zopf as Rhodophyscin is truly equivalent to skyrin is uncertain. This seems likely since *Physcia endococcina* (Körb.) Th. Fr., the species Zopf used as his source, is now known to contain skyrin (Kashiwadani, 1975).

European specimens of *Ph. orbicularis* rather commonly have an anthraquinone pigment associated with the soredia or the upper cortex, sometimes in relatively high and easily extractable concentrations. Chromatographic comparisons (see Table III below) have shown that this compound is definitely not skyrin. Attempts to identify it with one of the other common anthraquinone pigments listed by Culberson (1972) were unsuccessful, however. In North America very rarely a specimen of *Ph. orbicularis* or of *Ph. adiastola* has slightly orange pigmented soredia or upper cortex. In all cases the pigment has been present in such small amounts that attempts to extract it for chromatography have been unsuccessful. Its identity with the pigment in the European *Ph. orbicularis* has therefore not been proven.

In addition to anthraquinones, the members of this group often contain small and variable amounts of the triterpene zeorin and/or traces of similar unidentified compounds. Their occurrence seems to be sporadic in each of the three species dealt with here and no significance could be attached to there presence or absence.

TABLE III

TLC data for the major substances occurring in the *Physcia orbicularis* group. Numbers preceding the virgule (/) are the R_f values of the compounds listed, numbers following the virgule are the R_f values of norstictic acid and atranorin. The solvent systems are: (A) benzene-dioxane-acetic acid (180:45:5, 230 ml); (B) hexane-diethyl ether-formic acid (130:90:20, 240 ml); (C) toluene-acetic acid (200:30, 230 ml). The data are presented in a manner like those of Culberson (1972). See that publication for a discussion of R_f classes and other details regarding methods.

	R_f classes	R_f X 100		
		A	B	C
skyrin	5,4 or 5,3	36/34.5,71	17/15,56	16/22,58
Ph. orbicularis unknown pigm.	5,3,5	50/35,71	13.5/15.5,57	39/22,58
zeorin	5,5,5 or 6	49/34.5,71	21.5/15,56	42/23,57.5

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MYCOTAXON

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THE IDENTIFICATION OF CERTAIN WIDELY STUDIED STRAINS OF ENTOMOPHTHORA PATHOGENIC FOR APHIDS

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The use of certain *Entomophthora* species for the control of aphids is being investigated in several laboratories throughout the world. The identity of some of these species has been uncertain, and, since their pathogenicities probably differ greatly, we report here some of our observations on their taxonomy as a guide to others studying this group.

Strains RS-2 and RS-40 used for research at the University of Maine and distributed elsewhere have been labelled provisionally as *Entomophthora* "near *thaxteriana*" (Soper and Bryan, 1974; Soper *et al.*, 1974; Soper *et al.*, 1975). These strains were derived respectively from the green peach aphid, *Myzus persicae* (Sulzer), and from the potato aphid, *Macrosiphum euphorbiae* (Thomas), at Presque Isle, Maine. The morphology of the strains in question closely resembled that of *E. virulenta* Hall & Dunn (1957). However, aphids infected by the Maine strains of *E.* "near *thaxteriana*" were not attached to the substrate by rhizoids whereas *E. virulenta* was described as producing rhizoids (Hall and Dunn, 1957). Because the unidentified strains also resembled fungi referable to *E. thaxteriana* (Petch) Hall & Bell (1963a), a species which was believed to produce no rhizoids, these strains were designated as *E.* "near *thaxteriana*". This identification, which was subject to later modification, has caused some confusion which could be clarified only by determining the actual identities of these strains.

More recently, the dimensions of primary spores (conidia) and of resting spores from these strains were compared with those of material from the Thaxter collections upon which the name *Entomophthora thaxteriana* was based--and from which a lectotype will be designated in a subsequent publication. These comparisons indicated that the University of Maine strains could not be identified correctly as *E. thaxteriana*.

None of the numerous later reports of fungi identified as *E. virulenta* have unambiguously confirmed that this species produces rhizoids. For example, when Gustafsson (1965) mentioned that rhizoids could anchor insects infected by *E. virulenta*, he was citing the original description of Hall and Dunn (1957); in fact, he had found no rhizoids on any specimens he examined (Gustafsson, personal communication). Remaudière *et al.* (1976) suggested that the rhizoids noted by Hall and Dunn might have been observed from aphids which were infected simultaneously by another fungus which did produce rhizoids; individual diseased aphids often show mixed infections by 2 or 3 different species of *Entomophthora* (Soper and MacLeod, 1963).

Unfortunately, the significance of rhizoids for *E. virulenta* cannot be evaluated completely because Hall and Dunn neither discussed nor illustrated the nature of these structures, nor did they deposit any type specimens in an herbarium. However, one of the authors of *E. virulenta* has applied this name to a strain which was never observed to produce rhizoids (Hall and Bell, 1963b). Furthermore, we have found that rhizoids did not form on three species of aphids--*Myzus persicae, Aphis fabae* Scopoli, and *Acyrthosiphon pisum* Harris--infected experimentally with Hall's strain of *E. virulenta* deposited at the American

Type Culture Collection (ATCC #14270).

We therefore conclude that fungi lacking rhizoids but which otherwise fit the description of *E. virulenta* should be identified as *E. virulenta*. Because of this, all strains identified as *E. thaxteriana* must be re-examined to correct any possible misidentifications. Accordingly, the University of Maine strains previously labelled as *E.* "near *thaxteriana*" are now identified as *E. virulenta*.

A more complete comparative study of the morphological variation of these University of Maine strains, of the Hall strains of *E. virulenta* (ATCC #14270) and *E. thaxteriana* (ATCC #24421), of other strains of these fungi from established culture collections, and of the Thaxter collections mentioned above is now being completed by R. Humber. This later study will include a list of papers in which the identity of the strain discussed has been affected by our taxonomic decision.

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MYCOTAXON

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NEW SPECIES OF CORTICIOID FUNGI ON QUAKING ASPEN[1]

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SUMMARY

Four new species of lignicolous basidiomycetes in the Corticiaceae are described. These are *Hyphoderma arizonicum*, *Hyphoderma budingtonii*, *Hyphodontia magnacystidiata*, and *Laeticorticium simplicibasidium*. All are associated with a white rot of quaking aspen.

Quaking aspen (*Populus tremuloides* Michx.) is the most widely distributed tree in North America (Little, 1971). We have found approximately 235 species of wood-rotting basidiomycetes to occur on quaking aspen in a study now being completed. Four of these are described as new in this paper.

Microscopic characters were determined from freehand sections or crushed tissue in 4% KOH and phloxine and also in Melzer's reagent. Capitalized color names are from Ridgway (1912). Drawings were made with a camera lucida on a Leitz Dialux microscope.

HYPHODERMA ARIZONICUM Linds. et Gilbn., sp. nov. Fig. 1

Fructificatio late-effusa, adnata, membranacea, subrosea-bubalina vel pallida-brunnea; hyphae fibulatae; cystidia fusoidea, 40-60 x 5-7 µm; basidia anguste clavata, 4-sterigmatibus, 40-80 x 5-8 µm; basidiosporae ellipsoideae,

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[1] University of Arizona Agricultural Experiment Station Journal article No. 2675.

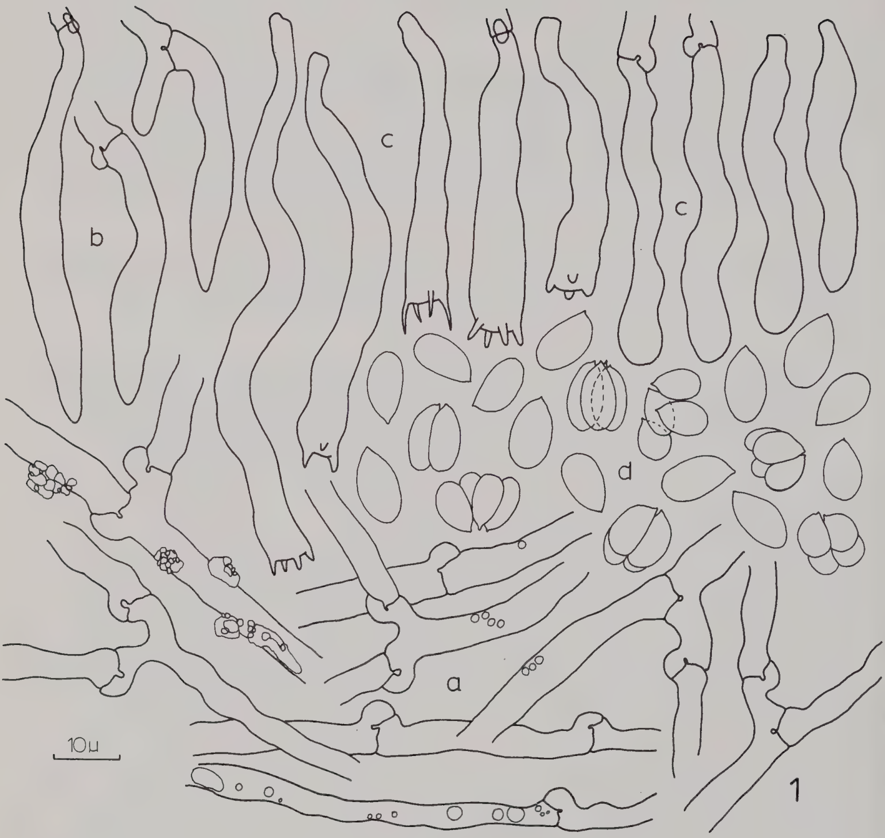


Fig. 1. *Hyphoderma arizonicum* (RLG 11284). a, subicular hyphae; b, cystidia; c, basidia; d, basidiospores, some adhering in groups of 2-4.

hyalinae, nonamyloideae, laeves, 8-10 x 4-5 µm, saepe in tetratibus.

HOLOTYPUS: in ligno *Populus tremuloides* Michx., Mt. Lemmon, Santa Catalina Mts., Coronado Nat. Forest, Pima County, Arizona, U.S.A.; leg. R.L. Gilbertson, No. 11284; in herb. Nat. Fungus Collections, Beltsville, Maryland, U.S.A. (BPI).

ETYMOLOGY: Named for the state of Arizona.

Basidiocarps becoming broadly effused, adnate, membranous; hymenial surface Pinkish Buff to Wood Brown, smooth, cracking on drying to expose white mycelial strands in subiculum; margin abrupt and fertile or with white, arachnoid mycelium; subiculum white, soft; hyphal system monomitic; subicular hyphae abundantly nodose-septate, thin- to slightly thick-walled, with frequent branching, 2.5-5 (-7.5) µm diam, with scattered coarse crystalline material; cystidia fusoid, thin-walled, not incrusted, 40-60 x 5-7 µm, with a basal clamp; basidia narrowly clavate, 4-sterigmate, often sinuous, 40-80 x 5-8 µm, with a basal clamp; basidiospores ellipsoid, hyaline, smooth, negative in Melzer's reagent, 8-10 x 4-5 µm, often adhering in groups of 4.

Hyphoderma arizonicum is associated with a white rot of dead, fallen aspen. The diagnostic characters are the fusoid cystidia and the ellipsoid spores, often adhering in groups of 4. *H. medioburiensis* (Burt) Donk also has cylindric, thin-walled cystidia but has much larger cylindric basidiospores, not adhering in groups of 4.

Specimens examined: Holotype previously mentioned; JPL 493, on quaking aspen, Columbine Ranger Station, Pinaleno Mts., Coronado Nat. Forest, Graham County, Arizona; JPL 552, RLG 11642, on quaking aspen, Mt. Lemmon, Santa Catalina Mts., Coronado Nat. Forest, Pima County, Arizona.

HYPHODERMA BUDINGTONII Linds. et Gilbn., sp. nov. Fig. 2

Fructificatio effusa, adnata, subrosea-bubalina vel pallida-bubalina, hydnacea; aculei breves, fimbriati; hyphae fibulatae; cystidia hyphoidea, 2.5-3 µm diam; gloeocystidia fusiforma vel mucronata, 7-35 x 4-6 µm; basidia clavata, 4-sterigmatibus, 30-35 x 4-6 µm; basidiosporae ellipsoidae, hyalinae, nonamyloideae, laeves, 5-6.5 x 3-3.5 µm. HOLOTYPUS: in ligno *Populus tremuloides* Michx., Mt. Lemmon, Santa Catalina Mts., Coronado Nat. Forest, Pima County, Arizona; leg. A.B. Budington, No. 1442; in herb. Nat. Fungus Collections, Beltsville, Maryland, U.S.A. (BPI).

ETYMOLOGY: Named for Arthur B. Budington, collector of the type specimen and student of the wood-rotting fungi.

Basidiocarps effused up to 5 cm, adnate; hymenial surface Pinkish-Buff to Light Buff, hydnaceous, the teeth

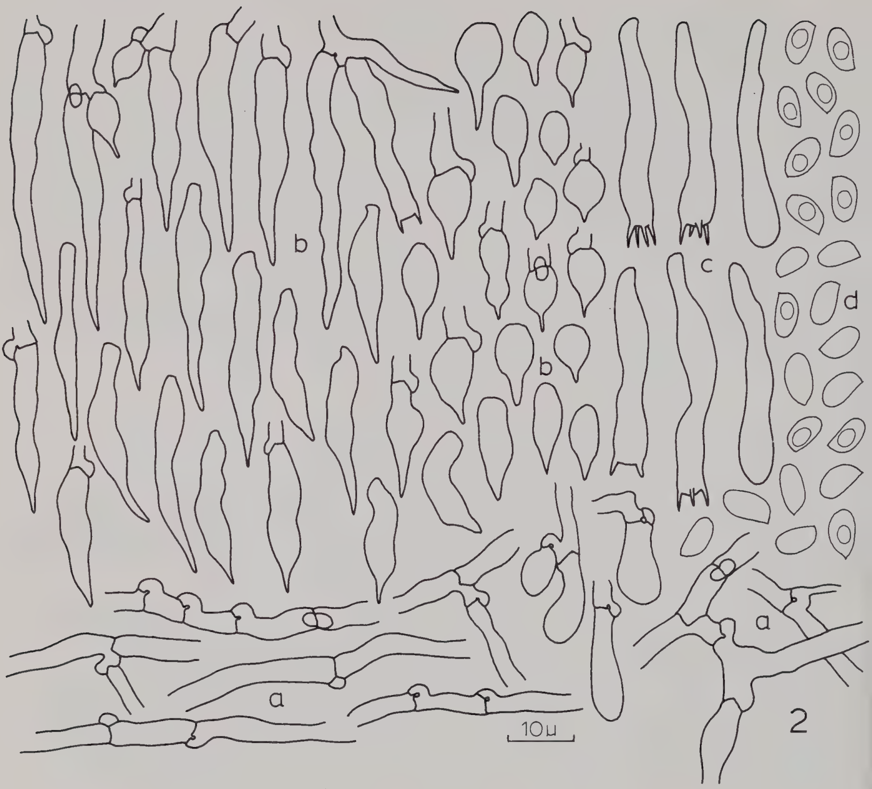


Fig. 2. *Hyphoderma budingtonii* (ABB 1442). a, subicular hyphae; b, gloeocystidia; c, basidia; d, basidiospores.

short, with fimbriate apices; margin thinning out, white, arachnoid; subiculum thin, pale buff; coarse pale buff rhizomorphs present on surface of wood under basidiocarp; hyphal system monomitic; subicular hyphae thin-walled, closely nodose-septate, with frequent branching, 2.5-4 µm diam; cystidia in hymenium hyphoid, thin-walled, not incrusted, numerous at apices of teeth, 2.5-3 µm diam, projecting up to 22 µm; gloeocystidia abundant in hymenial region and in subiculum, fusoid to sharply mucronate, 7-35 x 4-6 µm, highly refractive in Melzer's reagent, negative in sulfuric benzaldehyde, staining dark red in phloxine, with a basal clamp, some short and broad, others elongated, some of the latter with constrictions and appearing almost moniliform; basidia narrowly clavate, 4-sterigmate, 30-35 x 4-6 µm, with a basal clamp; basidiospores ellipsoid, hyaline, smooth, negative in Melzer's reagent, 5-6.5 x 3-3.5 µm.

Hyphoderma budingtonii is associated with a white rot of dead, fallen aspen. The diagnostic characters are the distinctive gloeocystidia and closely nodose-septate hyphae. Other species of *Hyphoderma* with gloeocystidia on quaking aspen are *H. mutatum* (Pk.) Donk, *H. pubera* (Fr.) Wallr., and *H. tenue* (Pat.) Donk. These all have much larger basidiospores and differ markedly in cystidial morphology.

Specimen examined: Holotype previously mentioned.

HYPHODONTIA MAGNACYSTIDIATA Linds. et Gilbn., sp. nov.
Fig. 3

Fructificatio late-effusa, mollis, cremea, hydnacea; aculei brevi, fimbriati; margo alba, floccosa vel arachnoidea; hyphae fibulatae; cystidia cylindrica vel capitata, 60-130 x 7-12 µm; basidia clavata, 4-sterigmatibus, 10-12 x 4-5 µm; basidiosporae ovoidae vel ellipsoidae, hyalinae, laeves, crassae-tunicatae, nonamyloideae, 5-6.5 x 3-4 µm. HOLOTYPUS: in ligno *Populus tremuloides* Michx., Paul Smith's, Franklin County, New York; leg. R.L. Gilbertson, No. 5481; in herb. Nat. Fungus Collections, Beltsville, Maryland, U.S.A. (BPI).

ETYMOLOGY: Named for the large cystidia.

Basidiocarps becoming widely effused, soft, easily separated from the substratum; hymenial surface cream-colored, hydnaceous, with short, scattered to crowded, fimbriate teeth; margin white, floccose to arachnoid; subiculum white, soft, thin; hyphal system monomitic; subicular hyphae moderately thick-walled, nodose-septate, with occasional branching, 2.5-3.5 µm diam, lightly to heavily incrusted with coarse crystalline material; cystidia frequent, thin-walled, cylindric to capitate or with median swollen portions, not incrusted or lightly incrusted with coarse crystalline material, 60-130 x 7-12 µm, projecting to 80 µm; basidia clavate, 4-sterigmate, 10-12 x 4-5 µm, with a basal clamp; basidiospores ovoid to ellipsoid, hyaline, smooth, with thickened walls, negative in Melzer's

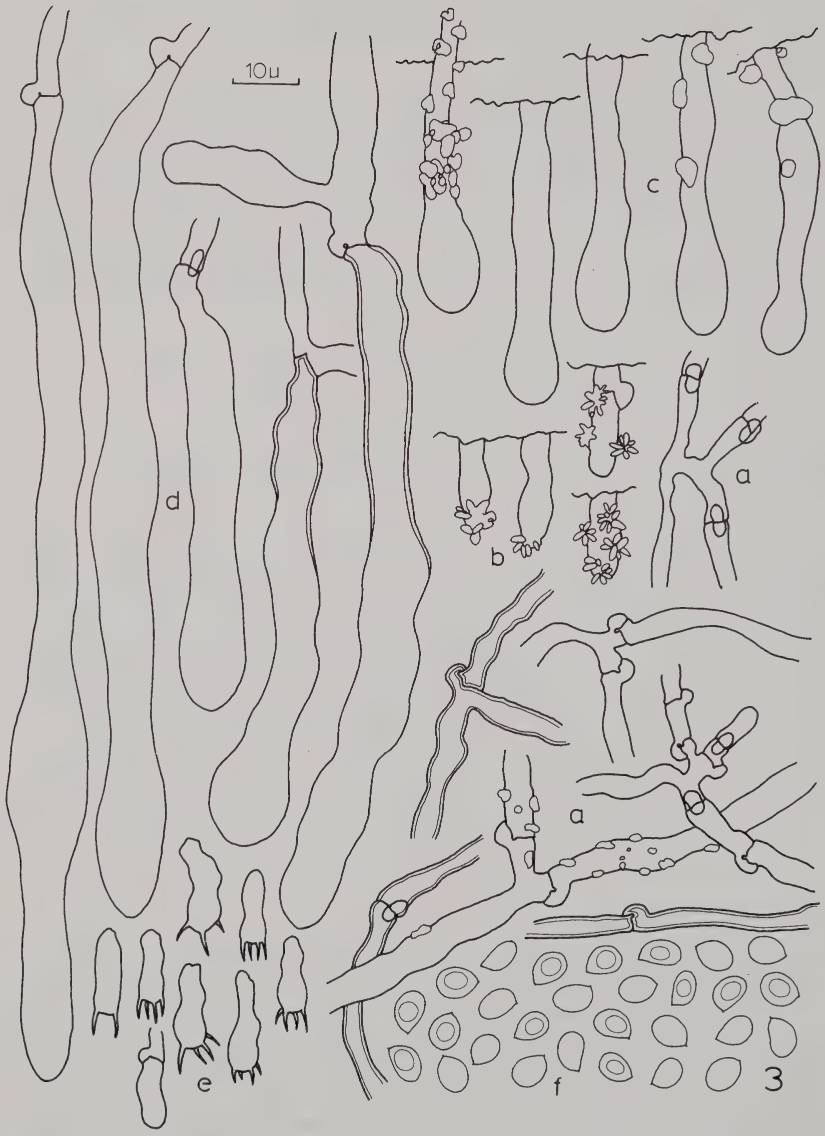


Fig. 3. *Hyphodontia magnacystidiata* (RLG 5481). a, subicular hyphae; b, small cystidia with rosettes of crystals; c, apices of larger cystidia; d, large cystidia, some with thickened basal portion; e, basidia; f, basidiospores.

reagent, 5-6.5 x 3-4 µm.

Hyphodontia magnacystidiata is associated with a white rot of dead, fallen aspen. The diagnostic characters are the large hymenial cystidia and the small basidia. Other species of *Hyphodontia* differ distinctly in cystidial morphology.

Specimen examined: Holotype previously mentioned.

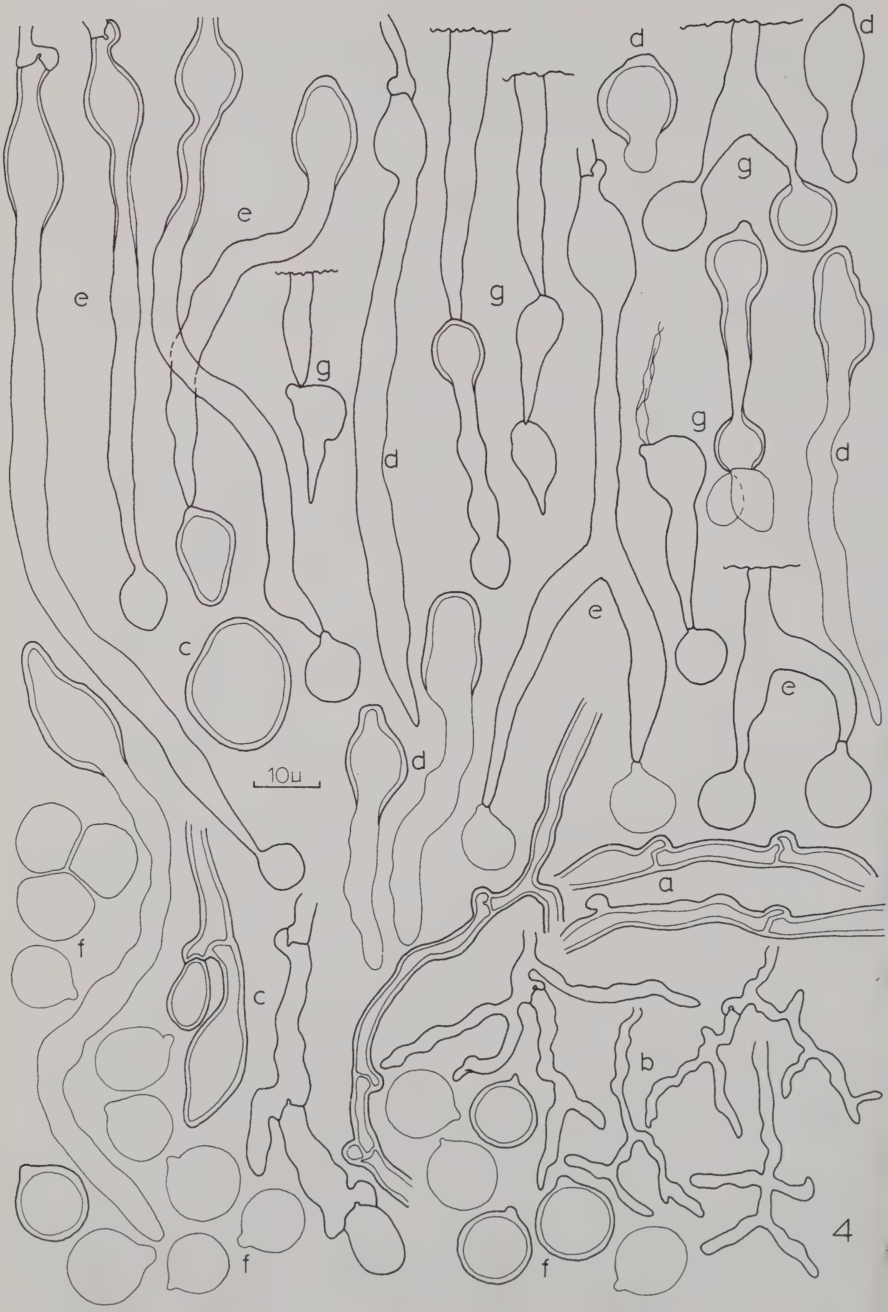
LAETICORTICIUM SIMPLICIBASIDIUM Linds. et Gilbn., sp. nov. Fig. 4

Fructificatio effusa usque ad 15 cm, adnata, purpurea, laeves vel tuberculata; hyphae fibulatae, 2.5-5.5 µm, crassae-tunicatae; dendrohyphidia adsunt; probasidia globosa vel ellipsoidea, crassa-tunicata; basidia angusta, tenuitunicata, simplicia vel bifurcata, 75-125 x 3-5 µm, 1-sterigmatibus; basidiosporae globosae, hyalinae, laeves, tenui vel crassae-tunicatae, nonamyloideae, 9-11 µm. HOLOTYPUS: in ligno *Populus tremuloides* Michx., Mt. Lemmon, Santa Catalina Mts., Coronado Nat. Forest, Pima County, Arizona; leg. J.P. Lindsey, No. 526; in herb. Nat. Fungus Collections, Beltsville, Maryland, U.S.A. (BPI).

ETYMOLOGY: Named for the simple, usually unbranched basidia.

Basidiocarps effused up to 15 cm, adnate; hymenial surface pinkish-buff at first, becoming reddish-purple at maturity, smooth to tuberculate; margin thinning out, pinkish-buff, entire to minutely fimbriate; subiculum dark purplish with a pale pinkish-buff layer next to the subtratum, less than 1 mm thick.

Hyphal system monomitic; subicular hyphae thin- to moderately thick-walled, abundantly nodose-septate, with occasional branching, 2.5-5.5 µm diam; cystidia none; dendrohyphidia abundant in catahymenium, thin-walled, much branched, with occasional clamps, 1.5-2.5 µm diam; probasidia developing at various levels in the catahymenium and subiculum, globose to ellipsoid, thick-walled, 8-15 x 15-30 µm; basidia elongated, narrow, unbranched or occasionally bifurcate, thin-walled, 75-125 x 3-5 µm, tapering at the apex to a single sterigma approximately 1 um wide; basidiospores globose, thin- to thick-walled, smooth, negative in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Melzer's reagent, 9-11 µm diam, with a large blunt apiculus, asymmetrically attached at the narrowed apex of the slender basidium, often germinating by repetition to give rise directly to secondary basidiospores.

Other species of *Laeticorticium* found on quaking aspen have typical 4-sterigmate basidia and ovoid to ellipsoid basidiospores (Larsen and Gilbertson, 1976). In spite of the unusual basidial structure, this fungus is placed in *Laeticorticium* because the thick-walled, nodose-septate hyphae, catahymenial development, dendrohyphidia, thick-walled probasidia, and general macroscopic appearance are all typical of that genus. To our knowledge, no other species of *Laeticorticium* exhibits repetitive spore production from the basidiospores.

Specimens examined: Holotype previously mentioned; RLG 11551, JPL 553, on quaking aspen, Mt. Lemmon, Santa Catalina Mts., Coronado Nat. Forest, Pima County, Arizona.

ACKNOWLEDGMENTS

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Fig. 4. *Laeticorticium simplicibasidium* (JPL 526). a, subicular hyphae; b, dendrohyphidia; c, probasidia; d, probasidia in various stages of germination; e, mature basidia with basidiospores, some bifurcate; f, basidiospores; g, basidiospores germinating by repetition.

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TAXONOMIC STUDIES IN THE PHACIDIALES: PROPOLIS AND PROPOLOMYCES

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SUMMARY

Propolis (Fr.) Corda, typified by *P. phacidioides*, a foliicolous Ascomycete with septate, acicular spores, antedates *Propolis* (Fr.) Fr., typified by *P. farinosa*, a lignicolous species with unicellular spores. *Propolomyces* is proposed as a new name for the latter genus. Redescriptions of five species of *Propolis* originally described in *Stictis* are provided; *S. panizzei*, *S. emarginata*, and *S. quercifolia* are transferred to *Propolis*.

Stictis, with over 200 described species, contains diverse heterogeneous elements. One of these is a group of fungi with immersed apothecia which are exposed by the splitting of the overlying substrate into teeth and occur predominantly on coriaceous leaves. Thin-walled asci exclude these species from *Stictis* and the Ostropales, and at least two species have been transferred to *Naemacyclus* in the Phacidiales (Dennis, 1960; Eriksson, 1970). A systematic investigation of *Stictis* revealed three other species, and numerous taxonomic synonyms, referrable to this group. At the same time it became clear, for reasons discussed below, that the correct name for the group was *Propolis* rather than *Naemacyclus*.

The name *Propolis* was first proposed by Fries (1822) as a subgenus of *Stictis*. Its place of publication at generic rank is usually given as Summa veg. Scand. (Fries, 1849; cfr. Dennis, 1968). Fries (1849) specifically attributes the name to himself and cites Flora Scanica (Fries, 1836) as the place of publication. The sole reference to *Stictis* and its segregates in Flora Scanica, "Huc genus Stictidis in plura genera suo tempore dividendum, praecipue Xylographae seorsim proponendae", does not constitute acceptance of either *Xylographa* (Fr.) Fr. or *Propolis* (Fr.) Fr., both of which properly date from 1849.

Corda (1838), examining available material in the old genus *Stictis*, independently arrived at the conclusion that the genus needed to be split. He raised *Propolis* to generic rank, citing *Stictis (Propolis)* Fries p.p, as a synonym, provided a careful description of the genus, and included a single species, *P. phacidioides*. *Stictis alba* Pers. (= *Propolomyces farinosus)* was retained in *Stictis*. *Propolis*, as a genus, must therefore date from 1838 and be typified by *P.*

phacidioides.

Fries (1849) did not mention Corda's treatment, although he must have been aware of it, but used *Propolis* in its older sense for Stictidaceous fungi with a pruinose hymenium. Three infrageneric taxa of uncertain rank were recognized: *Propolis* in the strict sense, *Melittosporium*, and b. *epiphylla*, the last containing *P. phacidioides* and *P. niveus* (Pers.) Fr., now considered a synonym of the holotype species of *Naemacyclus* Fckl.

The subsequent adoption of *Propolis* for species with unicellular spores was accidental and based on a series of misconceptions. Although Fries did not include spore characters in his description of *Propolis*, all of the species which formed the core of the genus had unicellular spores. By the time Fuckel (1873) proposed *Naemacyclus* for acicular spored foliicolous Stictidaceae, the second incorrect interpretation of *Propolis* was well established.

As Eriksson (1970) has indicated, Fries included at least two fungi in Scleromycetes Sueciae 297 under the name *Stictis phacidioides*. From the protologue, it is clear that a light-colored fungus with a pruinose hymenium was intended. Karsten (1870) equated a second, dark-colored fungus, which he renamed *Phacidium arctostaphyli*, with *Propolis phacidioides*, and this concept was widely accepted in the literature. As a result, *P. phacidioides* was left without a name, and, as the synonymy below indicates, has been redescribed many times.

The generic name *Propolis* cannot be used for lignicolous species with unicellular spores. *P. farinosa* and its allies are without a valid, taxonomically acceptable name in the Stictidaceae. A new name, *Propolomyces*, is therefore proposed for them.

PROPOLOMYCES Sherwood, nom. nov.

≡ *Propolis* (Fr.) Fr., Summa Veg. Scand. sect. post. 372 (1849) non *Propolis* (Fr.) Corda, Icon. fung. *2*: 38 (1838).
Lectotype species: *Stictis farinosa* Pers., Myc. Eur. *1:* 331 (1822).
≡ *Propolis farinosa* (Pers.) Fr., Summa Veg. Scand. sect. post. 372 (1849).
≡ **Propolomyces farinosus** (Pers.) Sherwood, comb. nov.

Fries (1822) included five species in *Stictis* subgen. *Propolis*. Of these, only *S. farinosa* appears in 1849 under *Propolis* in the strict sense; the other four species are accommodated in *Stictis*, *Propolis (Melittosporium)*, and *Propolis (b. epiphylla)*. I consider explicit exclusion of all but one of the original species from a type infrageneric taxon to constitute implicit typification sensu Korf and Rogers (1967).

A specimen (L: 910264-819) in Persoon's herbarium of *Stictis farinosa*, which I have designated as the type (since there is no collection data accompanying the specimen it is unclear whether this is a lectotype or neotype),is in poor condition, but appears to be the common lignicolous Ascomycete usually known as *Propolis faginea* (Schrad.) Karst. or *P. versicolor* (Fr.) Fr. Since the only specimen mentioned in the protologue of *Stictis versicolor* Fr. is the muriform-spored fungus now known as *Melittosporium versicolor* (Fr.)

Corda, the epithet *versicolor* is incorrect. It would appear that the correct basionymn under the current International Code of Botanical Nomenclature is the one sanctioned by Fries: *Stictis farinosa.* The more familiar epithet *faginea* is older, but is a devalidated pre-starting-point name. Pending study of species delimitations in this genus I defer transferring other species of *Propolis* to *Propolomyces.*

PROPOLIS (Fr.) Corda, Icon. fung. *2:* 38 (1838)

≡ *Stictis* subgen. *Propolis* Fr., Syst. mycol. *2*(1): 198 (1822)
Lectotype species: *Stictis phacidioides* Fries, Syst. mycol. *2*(1): 199 (1822).

Apothecia intraepidermal or subepidermal, lenticular in cross section, orbicular to somewhat elongate, opening by splitting the covering epidermis into 3 or more teeth. Covering layer colorless or brown, not carbonized, reduced, crystalliferous. Hymenium level with, or somewhat depressed from, the surface of the substrate, usually light-colored and pruinose. Asci uniformly thin-walled, pointed at the apex, without a distinct apical pore, J-. Ascospores long-cylindrical to acicular, colorless, simple or transversely septate, at most obscurely sheathed. Usually on dead coriaceous leaves.

Propolis differs from *Naemacyclus* in opening by teeth rather than by a slit, a character considered of taxonomic value at the generic level elsewhere in the Phacidiales. It differs from *Coccomyces* in lacking a well-developed, radiating, carbonized covering stroma, and from *Lasiostictis* in having J- asci and a thin, indistinct covering layer. *Propolis,* as treated here, may well encompass reduced forms of both of these genera. *Naemacyclus* was placed in the Hemiphacidiaceae by Korf (1962), but the asci and ascospores more closely resemble those of *Coccomyces, Lasiostictis,*and *Lophodermium.*

KEY TO SPECIES

A. Covering layer brown (B)
    B. Ascospores septate. On *Olea.* *P. panizzei*
    B'. Ascospores unicellular. On *Eucalyptus.* *P. emarginata*
A'. Covering layer colorless (C)
    C. Apothecia orbicular, with reflexed, strongly pruinose marginal lobes (D)
        D. Apothecia 0.5 - 1.0 mm broad. On a variety of hosts, tropical America. *P. quadrifida*
        D'. Apothecia less than 0.5 mm broad. On *Quercus,* temperate North America. *P. quercifolia*
    C'. Apothecia elongate, the lobes not reflexed. *P. phacidioides*

(1). PROPOLIS PANIZZEI (de Notaris) Sherwood, comb. nov.

≡ *Stictis panizzei* de Not., Comment. Soc. Crittog. Ital. *1*: 362 (1861)

Figure 1.

Apothecia intraepidermal, epiphyllous, 0.6 - 1.0 mm broad, orbicular, opening by splitting the epidermis into 4 -

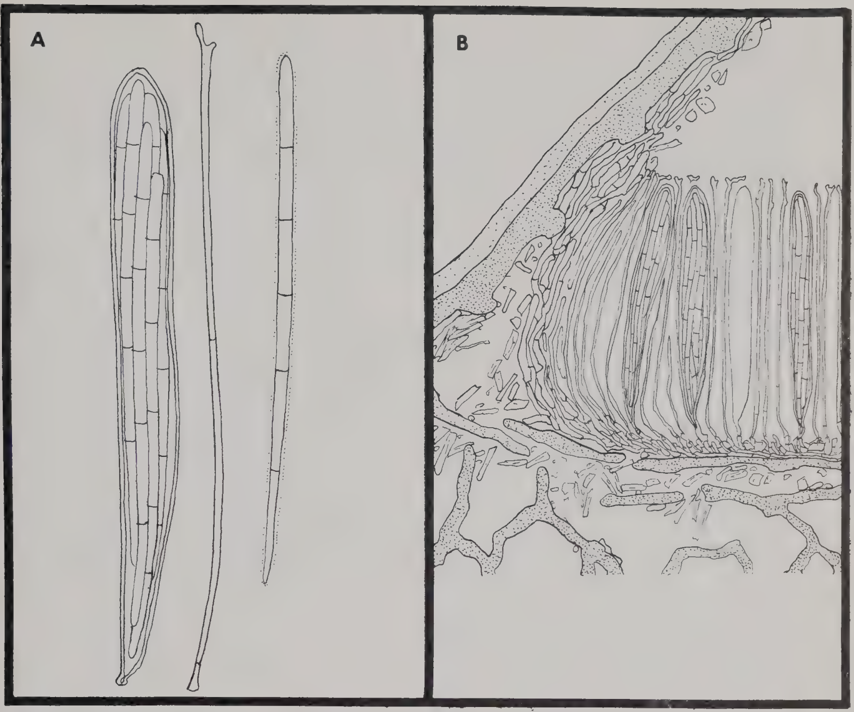

Figure 1. *Propolis panizzei*. A. Ascus, paraphysis, and spores, x750. B. Cross section of apothecium, x375. Drawn from NY-Rabenhorst 313.

6 lobes which are soon deciduous. Disc ochraceous, with a pale brown border. Margin consisting of 2 - 4 layers of brown, non-carbonized hyphae lying parallel to the reflexed epidermis, crystalliferous. Subhymenium c. 20µm thick, colorless in the center, brown toward the periphery of the apothecium. Paraphyses numerous, filiform, 1.5µm broad, branched near the apex, colorless, J-. Asci 100 - 115 x 10.5µm, uniformly thin-walled, pointed at the apex, J-. Ascospores 8, 75 - 105 x 2.5 - 3.0µm, colorless, 5-septate, with an obscure sheath.

On living leaves of *Olea*, causing the disease known as "Brusca", throughout the Mediterranean area. The gregarious intraepidermal apothecia ultimately cause the leaf cuticle and upper half of the epidermis to separate from the cells of the leaf, giving infected leaves their characteristic appearance.

SPECIMENS EXAMINED: EUROPE: Italy (PAD, Erbar. Crittog. Ital. 2241, San Remo, 1869)(NY, Rabenhorst Herb. Mycol. Ed. 2, 313, San Remo, De Notaris [authentic]).

(2). PROPOLIS EMARGINATA (Cooke & Massee) Sherwood, comb. nov.

≡ *Stictis emarginata* Cooke & Massee, Grevillea *18:* 7 (1889)
Figure 2.

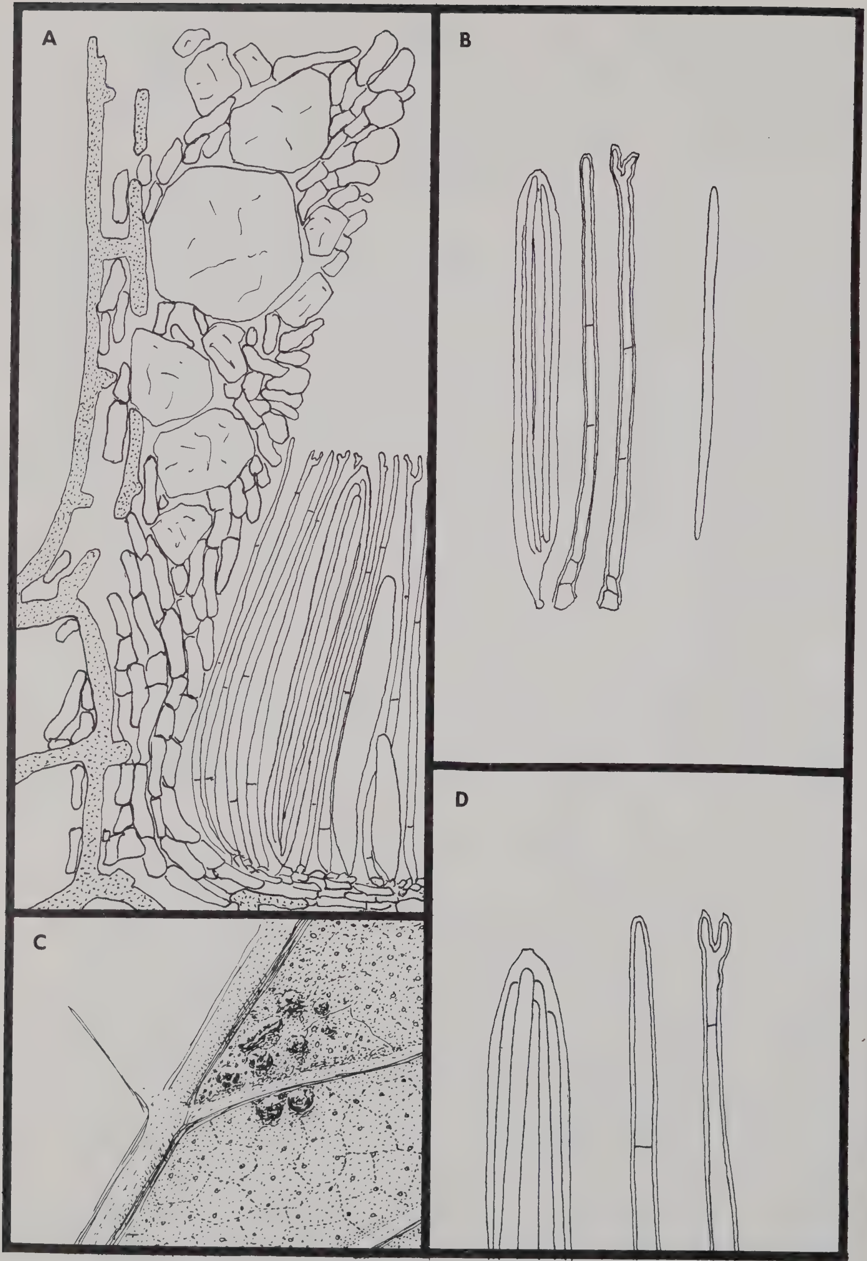

Figure 2. *Propolis emarginata*. A. Cross section of ascocarp, x750. B. Ascus, paraphyses, and ascospores, x750. C. Habit sketch, x7.5. D. Detail of ascus and paraphysis apices, x1500. Drawn from the holotype.

Apothecia immersed, subepidermal, amphigenous, 0.3 - 0.8 mm diam., orbicular, angular, or somewhat elongate, opening by 3-5 teeth, the disc pale grey-pruinose, the lobes dark, white-pruinose when rehydrated and reflexed, covering the disc when dry. Subhymenium and margin brown, the marginal hyphae 2.5 - 5µm in diameter, not carbonized, lying parallel to the reflexed substrate in the lower half, perpendicular to it in the upper half, crystalliferous. Asci 75 - 80 x 6 - 8µm, uniformly thin-walled, pointed at the apex, J-. Paraphyses numerous, filiform, 1.5 - 2µm broad, branched near the apex, J-. Ascospores 8, 55 - 70 x 1.5µm, not sheathed, not septate.

On dead leaves of *Eucalyptus*, Australia, Africa, and North America. This species illustrates some of the difficulties in defining generic limits in the Phacidiales. It has the perpendicular covering layer and unsheathed acicular spores characteristic of *Lasiostictis* (Phacidiaceae), the J- asci and foliicolous habit of a *Coccomyces* (Rhytismataceae) and the hymenium of *Propolis* (family uncertain).

SPECIMENS EXAMINED: AUSTRALASIA: Australia (K, on *Eucalyptus*, Martin 439, Holotype of *Stictis emarginata*). AFRICA: Canary Islands (CUP-MM 178; MM-305, on *Eucalyptus*, Tenerife; MM-993, on *Eucalyptus*, Gran Canaria). NORTH AMERICA: USA (TRTC 47464, on *Eucalyptus*, California).

(3) PROPOLIS QUADRIFIDA (Léveillé) Montagne in Gay, Fl. Chile 7: 425 (1852)

≡ *Stictis quadrifida* Lév., Ann. Sci. Nat. Bot. sér. 3, *5*: 255 (1846)
= *Stictis foliicola* Berk. & Curt., Journ. Linn. Soc. Bot. *10*: 371 (1868)
  ≡ *Naemacyclus foliicola* (Berk. & Curt.) Dennis, Kew Bull. *14*: 445 (1960)
= *Stictis chilensis* Speg., Fungi Chilensis 129 (1910)
= *Stictis coccolobi* Seaver & Waterston, Mycologia *32*: 399 (1940)
= *Stictis conocarpi* Seaver & Waterston, Mycologia *33*: 311 (1941)
?= *Stictis pimentae* Seaver & Waterston, *ibid.*: 313 (1941)
?= *Stictis serenoae* Cash, Mycologia *35*: 599 (1943)

Figure 3.

Apothecia subepidermal, amphigenous, 0.5 - 1.0 mm diam., orbicular, opening by 3 - 6 prominent, reflexed, white-pruinose teeth, the disc plane, somewhat depressed below the level of the substrate, pruinose, pale grey when fresh, drying grey, white, or yellowish (the color often variable within a single collection), becoming brownish when effete. Covering layer adnate to the ruptured epidermis, colorless or sometimes pale brown below, of 1-2 layers of hyphae 1.5µm diam., abundantly crystalliferous. Subhymenium colorless, c. 10µm thick, of small angular cells resting directly on host tissue. Asci 70 - 100 x 7 - 9µm, cylindric-clavate, uniformly thin-walled, pointed at the apex, J-. Ascospores 8, 65 - 80 x 2.0µm, tapering below, 3-septate. Paraphyses numerous, filiform, J-, 1.0µm broad below, enlarged and branched near the apex.

On dead coriaceous leaves throughout tropical and sub-

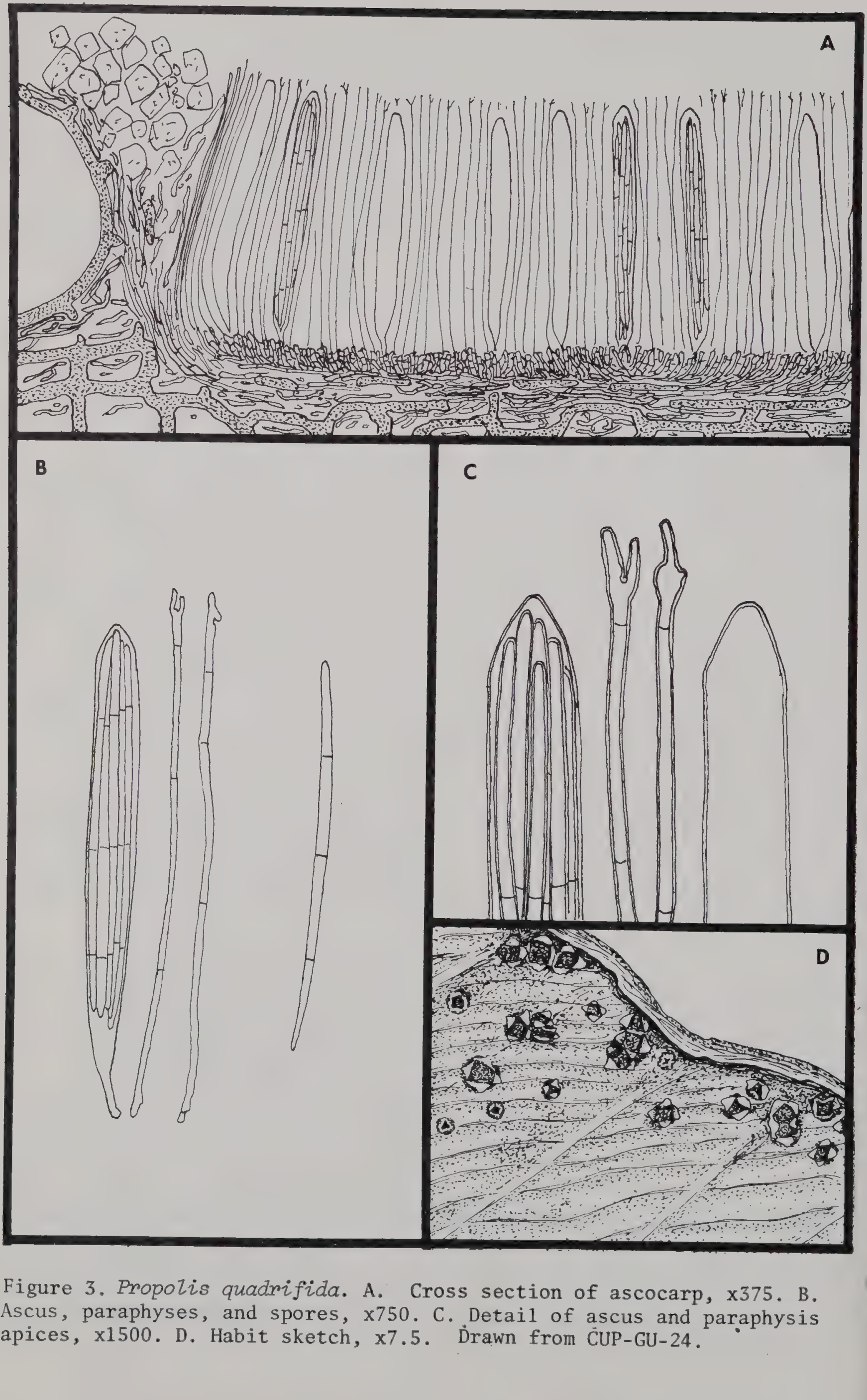

Figure 3. *Propolis quadrifida*. A. Cross section of ascocarp, x375. B. Ascus, paraphyses, and spores, x750. C. Detail of ascus and paraphysis apices, x1500. D. Habit sketch, x7.5. Drawn from CUP-GU-24.

tropical America. *Stictis serenoae*, which occurs on palm leaves and has a yellowish hymenium may possibly be distinct. The asci of *S. pimentae* measure 65 - 75 x 9μm; the asci of all the other specimens cited fall within the range given for the species. Dennis (1960; 1970) gives the measurements of the asci as 80 - 155 x 8 - 9μm. I have seen no asci longer than 100μm long in *P. quadrifida*. A similar, but apparently distinct species with a thick black basal stroma and asci 120 x 8μm also occurs in tropical America, and may have been included in Dennis's concept of *Stictis foliicola*. I was unable to locate Léveillé's type of *Stictis quadrifida*, but have little doubt that it is identical with *S. foliicola*. Physiological studies or cross inocculations on different hosts may ultimately prove that there is more than one taxon involved; the morphological picture is one of remarkable uniformity in all collections.

SPECIMENS EXAMINED: NORTH AMERICA: USA (BPI, on *Serenoa*, Florida, Shear 1396, holotype of *Stictis serenoae*)(CUP-D-7655, on *Persea*, Florida). Bermuda (NY, on *Eriobotrya*, Paget, 1942)(CUP 34624; 32627; 32640, on *Coccolobis*, authentic material of *S. coccolobi;* 34617, on *Conocarpus*, isotype of *S. conocarpi;* 34625, on *Pimenta*, isotype of *S. pimentae;* 34623, on *Pimenta*, paratype of *S. pimentae*). Cuba (FH, Cuba fungi 712, Wright, isotype of *S. foliicola*). Guadeloupe, F.W.I (CUP-GU-24; FH-GU-788, on *Clusia*). Puerto Rico (CUP-PR-1361, on *Clusia*). Mexico (CUP-ME-317, on a leaf, Oaxaca). Panama (NY-Pa-9, Prov. Panama, 11.VI.1975, K.P. Dumont, S.E. & S.M. Carpenter, S.A. Mori; Pa-57, on *Clusia, ibid.;* Pa-89, *ibid.;* Pa-315, Prov. Chocle, *ibid.*, 14.VI.1975; Pa-328, *ibid.*; Pa-279, on *Clusia, ibid.;* Pa-177, 13.VI.1975, *ibid.;* Pa-1548, Prov. Panama, K. P. Dumont, S.E. Carpenter, S.A. Mori, 30.VI.1975). SOUTH AMERICA: Ecuador. (FH-Patouillard, on *Myrtus*)(NY-Ec 1443, prov. Pastaza, K.P. Dumont, S.E. Carpenter, P. Buriticá, 24.VII.1975; Ec-1907, Prov. Zamora, *ibid.*, 1.VIII.1975). Colombia (NY-Co-1405, Dto. Cauca, K.P. Dumont, J.H. Haines, J.M. Idrobo, L.F. Velasquez, 15.VII.1974; Co-1290, on *Rapanea, ibid.*, 14.VII.1974; Co-74, Dto. Cundinamarca, *ibid.*, 28.VI.1974; Co-3828, Dto. Putumayo, K.P. Dumont, P. Buriticá, L.A. Molina, J. Luteyn, 28.I.1976) Venezuela (NY-Ve-89, on *Clusia*, Edo. Miranda, K.P. Dumont, J.H. Haines, B. Manara, 18.VI.1971; Ve-127, on *Clusia, ibid.;* Ve-6091, on *Clusia*, Dto. Federal, K.P. Dumont, R.F. Cain, G. Samuels, 27.VII.1972; Ve-6183, *ibid.*) Chile (LPS 28232, three specimens collectively labelled *Stictis chilensis:* on *Boldoa*, Concepción, lectotype, designated here; on *Boldoa*, Concepción, lectoparatype; on *Aetoxicum*, Concepción, lectoparatype).

(4). PROPOLIS QUERCIFOLIA (Cooke & Ellis) Sherwood, comb. nov.

≡ *Stictis quercifolia* Cke. & Ell., Grevillea *5*: 50 (1876)
= *Stictis quercina* Peck, Report N.Y. State botanist *28*: 69 "1875" (1879).

Figure 4, A, B.

Apothecia amphigenous, 0.2 - 0.5 mm diam., orbicular, opening by 3-5 reflexed, white-pruinose teeth, the disc yellow-pruinose, slightly depressed below the level of the substrate. Covering layer scant, colorless, crystalliferous, of hyphae 1.5 - 2.0μm diam., running parallel to the surface of the substrate. Paraphyses numerous, filiform, 1.0μm

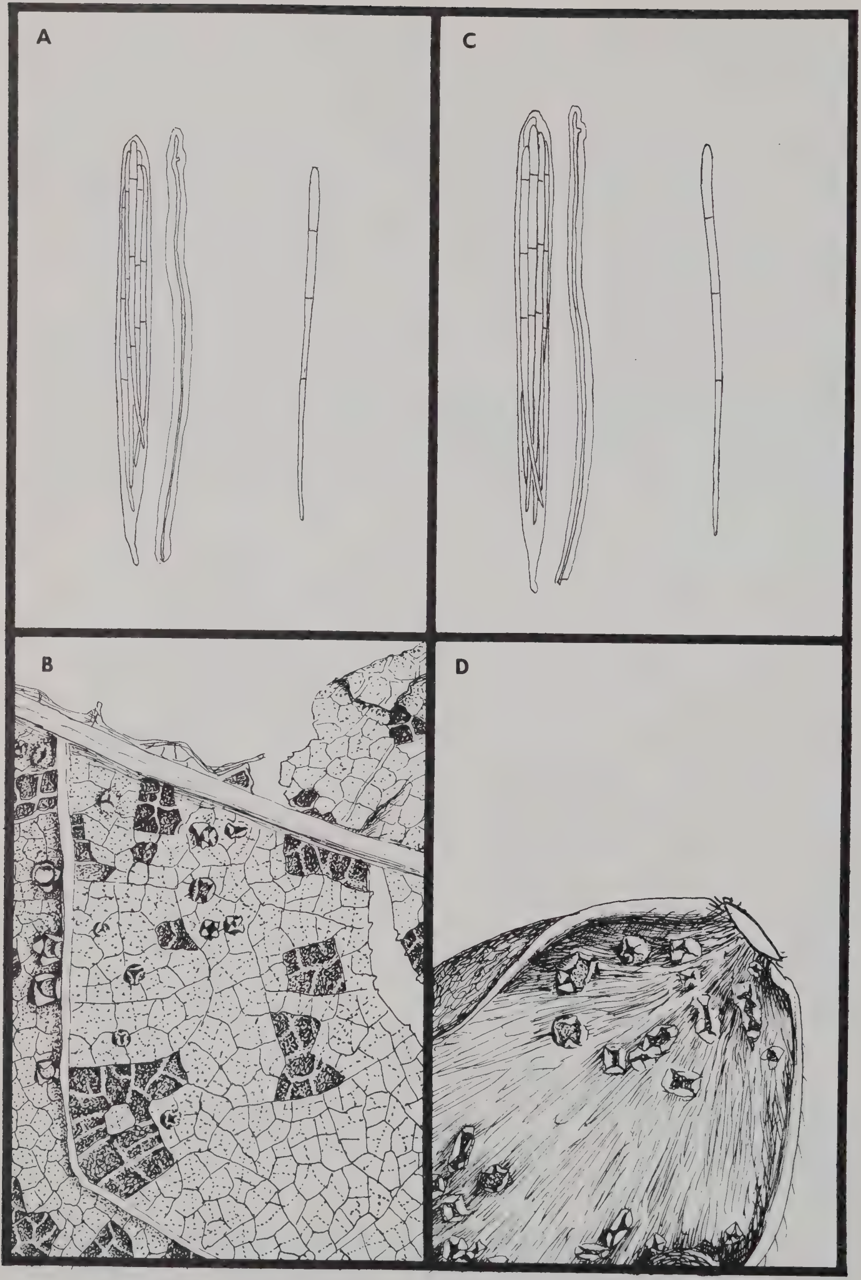

Figure 4. *Propolis quercifolia*. A. Ascus, paraphysis, and spores, x750. B. Habit sketch, x7.5. Drawn from CUP 25490. *Propolis phacidioides*. C. Ascus, paraphysis, and spores, x750. D. Habit sketch, x 7.5. Drawn from CUP-D-7708.

broad, sheathed, J-, branched and crystalliferous at the tip. Asci 65 - 81 x 5 - 6µm, thin-walled, pointed at the apex, J-. Ascospores 8, 50 - 65 x 1.5µm, 3-septate, not sheathed.

On dead leaves of *Quercus* (red oak group), eastern North America. Apparently distinct from *P. phacidioides*, which is not known to occur in the Atlantic coast of North America, although its Ericaceous hosts are common enough there.

SPECIMENS EXAMINED: NORTH AMERICA: USA (CUP-D-6235, Port Jarvis, N.Y., isotype of *Stictis quercina*, D-6236, Peck, Phoenicia, N.Y.; CUP - 29167, Massachussetts, Linder & White; CUP-D-7656, Ellis, New Jersey, 22.VIII. 1896; D-7657, Ellis, N.J., 7.VIII.1885; D-8112, Ellis, Newfield, 1876 [perhaps an isotype of *Stictis quercifolia*]; D-9366, Ellis, North American Fungi 149) (Herb. Sherwood 2284, N.J., 28.X.1976).

(5). PROPOLIS PHACIDIOIDES (Fr.) Corda, Icones fung. *2*: 38 (1838)

≡ *Stictis phacidioides* Fr., Syst. Mycol. *2*(1): 199 (1822)
  ≡ *Naemacyclus phacidioides* (Fr.) B. Eriks., Symb. Bot. Upsal. *29*(4): 49 (1970)
= *Stictis anaexa* Speg., Michelia *2*: 261 (1881)
= *Stictis vaccinii* Ell. & Ev., Proc. Acad. Philadelphia *46*: 352 (1894)
= *Stictis myricae* Cash, Mycologia *50*: 655 "1958" (1959)

Additional synonyms are given by Eriksson (1970)

Figure 4, C,D.

Apothecia hypophyllous, 0.3 - 0.8 mm broad, orbicular to somewhat elongate, opening by 3-5 teeth which cover the disc in dried material, the disc yellow, pruinose, the covering layer 15 - 20µm thick, of colorless hyphae 3.0 - 3.5µm diam., short-celled, vertically-oriented, its inner face with sparse, colorless periphysoidal hyphae, particularly near the margin. Paraphyses filiform, 1.0µm broad, sometimes branched, crystalliferous, J-. Asci 75 - 105 x 5 - 6µm, uniformly thin-walled, pointed at the apex, J-. Ascospores 8, 60 - 75 x 1.5 - 2.0µm, 3-septate, not sheathed.

On evergreen coriaceous leaves in cool regions. A predominance of Ericaceous hosts in the temperate evergreen flora, rather than true host preference, may be responsible for the known host range. Cash (l.c.) cited somewhat longer asci, J+ ascus apices, and spores lying straight in the asci as points of difference between *Stictis myricae* and *S. vaccinii*. I find the asci in her type material to be J- even after rehydration in 2% KOH. The spores of *S. vaccinii* lie straight in the ascus if sectioned rather than crush-mounted.

SPECIMENS EXAMINED: EUROPE: Sweden (FH, Fries, Sclerom. Sueciae 297, on *Arctostaphylos uva-ursi*, isotype of *S. phacidioides*). Italy (LPS 28243, on *Vaccinium*, holotype of *S. anaexa*). Great Britain (IMI 115071, on *Metrosideros*, Scilly Isles). NORTH AMERICA: USA (CUP, NY California Fungi 1209, on *Myrica*, isotypes of *S. myricae*)(CUP-D-7708, on *Vaccinium*, isotype of *S. vaccinii*; CUP-California fungi 1112, on *Vaccinium*).

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MYCOTAXON

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TYPE STUDIES IN THE POLYPORACEAE 9. SPECIES DESCRIBED BY E.M. WAKEFIELD.

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SUMMARY

18 species described by E.M. Wakefield in the Polyporaceae have been reviewed and the types examined. 11 species are accepted, 6 are treated as synonyms whilst one species belongs in another family. The combination Aurificaria shoreae (Wakf.) Ryv. is proposed.

Miss Elsie M. Wakefield was appointed in 1910 as assistant to George Massee at the Herbarium, Royal Botanic Gardens, Kew. She became head of the mycology department in 1915 where she remained until her retirement in 1951. She was made Deputy of the Herbarium in 1945.

She received large collections of fungi for identification from different parts of the world, including a number of species which she described as new. She had access to the excellent collections at Kew and as a modern mycologist always used the microscope. Thus, she avoided the pitfall of many earlier mycologists who described numerous species based only on external morphology reflecting different stages of development and age. The following list shows that Wakefield had a sound taxonomic judgement, and most of her species have been accepted by later mycologists. Nevertheless, it seemed desirable to compile a survey of her species which were published over many years and in many different journals. For mycologists and plant pathologists working in the tropics without a good library at hand it may be advantageous to have the relevant data of her species in a single paper.

The species are placed alphabetically according to the genus in which they originally were described and within each genus alphabetically according to the specific epithet. The type locality is given, and the original label is cited in inverted commas. Unless otherwise stated, all holotypes are in the Herbarium of the Royal Botanic Garden, Kew, London (K).

Amauroderma fuscoporia Wakef., Bothalia 4:948, 1948. "Salisbury, Rhodesia, 20-03-1939. J.C.F. Hopkins, no. 4441". This is a characteristic species in the genus, apparently restricted to the so-called *Brachystegia*-zone across southern tropical Africa. I have myself seen specimens from South Africa, Rhodesia, Angola, Zambia, Malawi and Mozambique.

Characteristic is the smooth surface which is quite a rare feature in *Amauroderma* Murr. and the elongate spores (10-14 um long). For a more detailed description, the reader is referred to Furtado (1968).

Amauroderma infundibuliforme Wakef., Bull. Misc. Inf. Kew. 1917:309, 1917. "Uganda, Bumpenge forest, Coll. T. Maitland 24a".

This too is a characteristic species of the genus with conspicuous infundibuliform fruitbodies covered with a black distinct crust. The species must be rare, as it is still known only from the type collection. The species was transferred by Steyaert (1972) to his genus Magoderna. I would like to see SEM photographs of the spores of *A. infundibuliforme* and related species before I unconditionally accept its transfer to another genus.

Favolus sarasinii Wakef., Vierteljahrschr. Naturf.-Gesellsch. Zürich 61:629, 1961. "New Caledonia, Hienghese, Sarasin 65, June 1911".

This is not a polypore, but a species of *Favolaschia* (Pat.) Pat.

Fomes elegans Wakef., Bull. Misc. Inf. Kew, 1918:207, 1918. "India, Singgbhum, R.S. Hole 1916, on living *Shorea robusta*".

The type represents a fine specimen of *Pyrofomes tricolor* (Murr.) Ryv., originally described from the Philippine Islands. The genus *Pyrofomes* Kotl. & Pouz. is characterized by a brick red to orange brown colour of the context, a trimitic hyphal system with clamped generative hyphae and skeletal hyphae which are often weakly dextrinoid. The spores are truncate, thick-walled and light yellowish brown.

Pyrofomes tricolor is known only from Asia, i.e. from India to the Philippine Islands.

Fomes pseudoferreus Wakef., Bull. Misc. Inf. Kew, 1918: 208, 1918. "Kuala Lumpur (Malaya), Comm. W.N.C. Belgrave 1917".

This is *Ganoderma philippii* Bres. & Henn. according to Steyaert (1972:72).

Fomes mundulus Wakef., Kong. Norske Vidensk. Selsk. Forhand. Vol. 9, nr. 12:44, 1936".
"Africa, S. Rhodesia, Victoria Falls, 11-12/1930, leg. O.A. Höeg, no. F 76". Holotype in TRH, lectotype in K, both examined.

This is a characteristic species of Perenniporia Murr. to which it was transferred by Ryvarden (1972). It is perennial with a black crust and a distinctly stratified tube-layer. The spores are truncate, thick-walled and dextrinoid. The latter is also the case in part with the skeletal hyphae. The species seems to be restricted to the "Brachystegia-"zone across southern Africa.

A closely related species seems to be Vanderbylia ungulata Reid described from Tanzania (Reid 1973). Vanderbylia Reid is typified by Vanderbylia vicina (Van der Byl) Reid, an illegitimate combination as no basionym was cited. Further, some mistake must have crept in as the original author of the specific epithet is given as Van der Byl, while Lloyd is given as the author on the preceeding page (Reid 1973, p. 163-164).

Fomes zuluensis Wakef., Bothalia 4:948, 1948.
"Zululand (South Africa) Nkandhla Forest., Mar. 1938., leg. W.G. Rump 374. Herb. Myc. Pretoria 30186".

This is a good species which was transferred to Fomitopsis Karst. by Ryvarden (1972) owing to the perennial growth and a distinct crust on the pileus. The hyphal system is trimitic with clamped generative hyphae and hyaline binding and skeletal hyphae.

Ganoderma simulans Wakef., Bull. Misc. Inf. Kew, 1922: 161, 1918. "B.E. Africa, Mazeras, T.D. Maitland no.556".

This is Ganoderma subresinosum (Murr.) Humphrey according to Steyaert (1972), as noted by myself when I first examined the type of Wakefield's species in 1971. Steyaert has transferred the species to his genus Magoderna.

Hexagonia sericata Wakef., Bull. Misc. Inf. Kew, 1922:161, 1918. "Nairobi, Coll. Sumerun, Comm. T.D. Maitland no. 534".

Both this and the following species represent, according to my concept, Hexagonia speciosa Fr.. This species was described from South Africa and is known to extend along the eastern part of the continent, but is nowhere common. The pileus is shiny with brown colours and velutinate to finely tomentose in narrow to broad concentrical zones. There seems to be a secondary growth on the pileus on aging, and from the base it can be covered with a slightly thicker and more cottony tomentum of adpressed hyphae. The growth starts at the base as isolated spots and irregular protuberances, but later it becomes coherent, usually lighter in colour than the original tomentum and mostly azonate. This type of growth is known for other Hexagonia species, for example H. velutina Pat. & Har. and it may be an xeromorphic adaptation.

The striking and seemingly fairly constant character is the pore size. The pores are hexagonal ranging from 2-5 mm wide. The hyphal system and the spores are in general typical for the genus.

Hexagonia subvelutina Wakef., Bull. Misc. Inf. Kew, 1917: 310, 1917. "Brit. East Africa. Comm. W.J. Dawson no. 530, 1916".

This is Hexagonia speciosa Fr., for comments see the preceding species.

Polyporus australiensis Wakef., Bull. Misc. Inf. Kew, 1914:157, 1914. "Australia, Queensland, Coomera River, on logs. C.T. White Feb. 1912".

This is a beautiful species belonging to Piptoporus and was transferred by Cunningham (1965:107) and to which the reader is referred for a detailed description.

Polyporus coffeae Wakef., Bull. Misc. Inf. Kew, 1917:308, 1918. "Uganda, Magigye Eastate, May 1951, W. Small no. 327, on roots of dead coffee tree".

The type represent Diacanthodes novo-guineenses (Henn.) Fidalgo as indicated by Fidalgo (1962), who provided a detailed description of the species and its associated conidiiferous form and disease.

Polyporus doidgeae Wakef., Bothalia 4:948, 1948. "South Africa, Natal, Polela distr. Donnybrook, Hopevale, Feb. 1939, leg. K.E. Morgan", on Acacia mollissima.

This is a good species in Polyporus s. str. characterized by a dimitic hyphal system with clamped generative hyphae and arboriform binding hyphae.

Polyporus pyrophilus Wakef., Bull. Misc. Inf. Kew, 1916: 71, 1917. "Nigeria, Nsulu, May 1941, Farguharson no. 50".

The species has previously been transferred to Coltricia S.F. Gray by Ryvarden (1972) owing to the brown stipitate fruitbodies and monomitic hyphal system with coloured, simple septate generative hyphae. The species has as yet been noted only from burnt ground amongst ash.

Polyporus raphanipes Wakef., Bull. Misc. Inf. Kew, 1914:157, 1914. "Nigeria, North Prov., Leg. J.S. Macfies, 1912".

The species belongs in Polyporus s. str. It is close to Polyporus tricholoma Mont. and its taxonomic status and validity can only be decided when the complex of tropical species around *P. tricholoma* has been treated in detail.

Polyporus shoreae Wakef., Bull. Misc. Inf. Kew, 1916:72, 1916. "India, Bengal, Buxa Div., Comm. F.J.F. Shaw, Jan. 1915".

The species was adequately described by Bakshi (1971:124) to whom the reader is referred. Typical of the species is the distinct crust on the pileus, making it somewhat similar to *Aurificaria indica* (Mass.) Reid. As in this species, *P. shoreae* has a monomitic hyphal system with simple septate hyphae. *Aurificaria indica* is the type species of *Aurificaria* Reid, a genus close to *Inonotus* Karst., separated mainly by the distinct crust on the pileus. *Aurificaria indica* has coloured spores whilst those of *P. shoreae* are hyaline. The same type of variation is known within *Inonotus* where some species have hyaline spores whilst those of other species are more or less coloured, ranging from light yellowish to rusty brown. Thus, the different colouration of the spores between *P. shoreae* and *A. indica* is no obstacle to a congeneric placement. The crust on the pileus of *P. shoreae* indicates clearly, at least to me, that it is best placed in *Aurificaria*. Thus, the following combination is proposed: *Aurificaria shoreae* (Wakef.) Ryv. comb. Basionym: *Polyporus shoreae* Wakef., Bull. Misc. Inf. Kew, 1916:72, 1916.

Polystictus mimetes Wakef., Kongl. Norske Vidensk. selsk. Forhand. Vol. 9, no 13:47, 1935. Holotype in TRH, lectotype in K, both examined. "Rhodesia, Victoria Falls, 11-12/2-1930, leg. O.A. Høgh, no. F 84".

I have previously transferred the species to *Trametes* Fr. (Ryvarden, 1972) because of the trimitic hyphal system, hyaline spores, and clamped generative hyphae. I have myself collected the species in Tanzania, Zambia and Malawi and it may be restricted to the *Brachystegia* zone similar to *Amauroderma fuscoporia* and *Perenniporia mundula*. The pileus is smooth, concentrically zoned with slightly sulcate, light brownish zones. The fruitbody is relatively thin and coriaceous.

Polystictus violaceus Wakef., Bull. Misc. Inf. Kew, 1916: 72, 1916. "Uganda, Namutambula Forest, Jan. 1915, Maitland no. 103".

The species is a characteristic member of the genus *Nigroporus* Murr. owing to the dimitic hyphal system, with pale coloured skeletal hyphae, giving a dark, slightly violaceous tint in all the members of the genus. The spores are thick-walled and tinted pale. It was transferred to *Nigroporus* by Ryvarden (1972) and the species is probably rare as it is only known from the type collection.

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MYCOTAXON

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EXOPHIALA SPINIFERA, A NEW COMBINATION FOR *PHIALOPHORA SPINIFERA*

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ABSTRACT

Phialophora spinifera Nielsen et Conant is redescribed and transferred to the genus *Exophiala* Carmichael.

INTRODUCTION

Nielsen and Conant (6) isolated a dematiaceous hyphomycete from a nasal granuloma and described the fungus as *Phialophora spinifera* Nielsen et Conant, 1968. The hyphomycete was characterized by deeply pigmented spine-like conidiophores, phialides with collarettes and non-septate conidia which developed semi-endogenously.

Study of the type strain of *P. spinifera* (ATCC 18218) has revealed that the conidiogenous cells of this fungus are annellides. Therefore, *P. spinifera* is transferred to the genus *Exophiala* Carmichael.

TAXONOMIC PART

Exophiala spinifera (Nielsen et Conant) McGinnis, comb. nov. (Fig. 1).
≡ *Phialophora spinifera* Nielsen et Conant, Sabouraudia 6:228-229, 1968.

Colonies are yeast-like, black, gradually becoming effuse, raised, 3.5 cm in diameter after 14 days at 30°C on potato dextrose agar. Coloration is greenish black with an olivaceous black reverse color. Growth is present at 37°C. Mycelium is superficial, partly immersed, cylindrical to rarely toruloid, septate, branched, smooth and pale brown. Conidiophores are semi-macronematous to macronematous, branched or unbranched, smooth, dark brown and spine-like. Conidiogenous cells are: integrated, 1.6 - 2.7 x 5.9 - 11.2 (average 2.1 x 8.0) μm, with the annellations arising close to a septum; terminal, 1.5 - 2.8 x 5.4 - 14.4 (average 2.2 x 7.8) μm; or as thick-walled chlamydoconidia-like cells which are variable in size and shape. Conidiogenous cells are monoblastic, rarely polyblastic, percurrent, closely annellated, cylindrical, obclavate or lageniform, smooth, pale brown to almost black. Anelloconidia are exogenous, non-septate, subglobose, ellipsoidial to cylindrical, smooth, hyaline and 1.0 - 2.9 x 1.8 - 3.9 (average 1.7 x 2.5) μm. Annelloconidia aggregate in masses which tend to slide down the conidiophore or along the hypha. Yeast-like cells with blastoconidia are present.

Habitat: soil, occasional pathogen of man.

Type: ATCC 18218

Material examined: ATCC 18218 (Duke 3342),nasal granuloma.

DISCUSSION

Exophiala bears a similarity to *Phialophora* Medlar and *Wangiella* McGinnis, but differs in its method of conidium ontogeny. *Exophiala* is characterized by the development of annellides (1), whereas *Phialophora* (2) and *Wangiella* (4) produce phialides. Nielsen and Conant (6) have described phialides with collarettes in *E. spinifera*. Phialides with collarettes were not observed in this investigation.

E. spinifera is similar to *E. jeanselmei* (5) and *E. pisciphilus* (3). It is distinguished from *E. jeanselmei* by its spine-like conidiophores, narrower and more elongate annellides and more cylindrical annelloconidia. *E.*

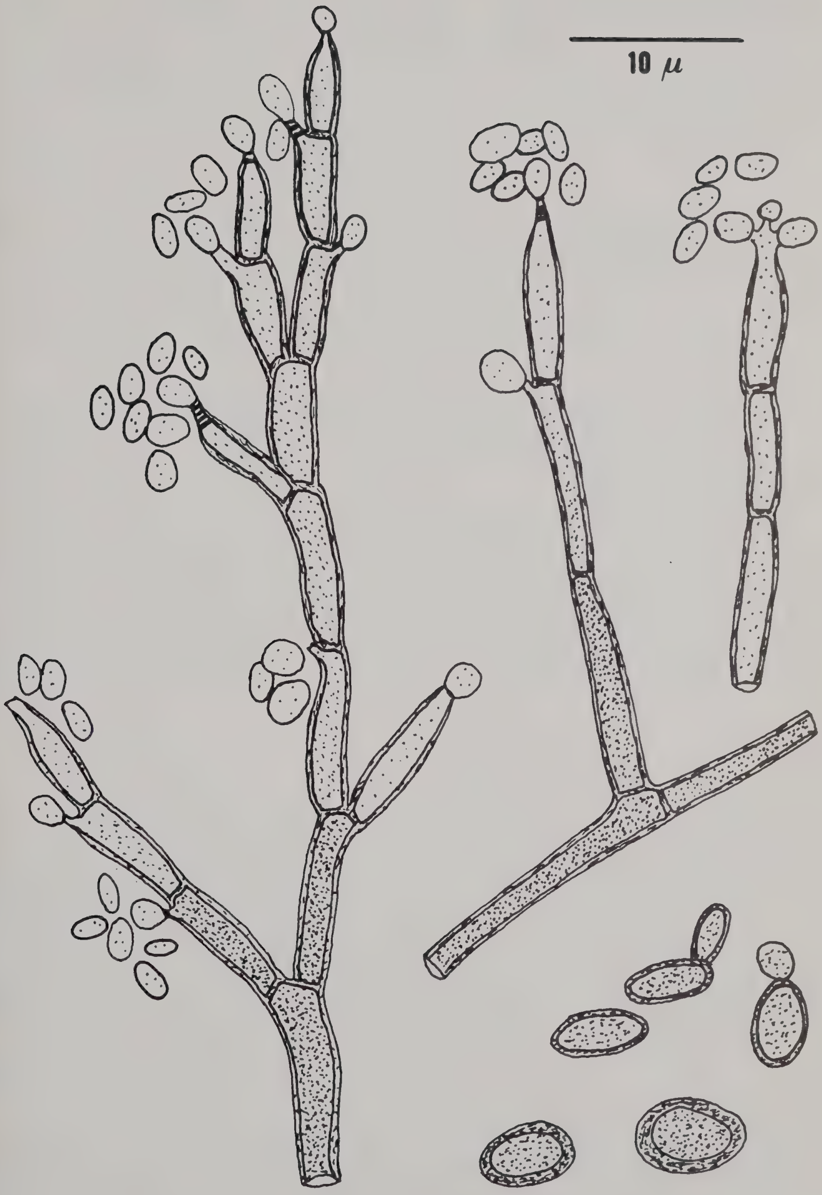

Figure 1. *Exophiala spinifera*. Conidiophores, conidia and yeast-like cells. ATCC 18218.

spinifera is readily separated from *E. pisciphilus* by its ability to grow at 37°C, yeast-like colonies, presence of yeast-like cells, toruloid hyphae and smaller annellides and annelloconidia.

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EXOPHIALA JEANSELMEI, A NEW COMBINATION FOR *PHIALOPHORA JEANSELMEI*

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ABSTRACT

The new combination *Exophiala jeanselmei* (Langeron) McGinnis et Padhye is proposed for a perennially confused taxon which was originally described as *Torula jeanselmei* Langeron and subsequently placed in the genera *Pullularia*, *Phialophora* and *Rhinocladiella* by various authors.

INTRODUCTION

De Beurmann and Gougerot in 1907 (3) isolated a dematiaceous hyphomycete from a subcutaneous cyst. Matruchot (19) obtained the isolate and concluded that it was a stable morphological variant of *Sporothrix schenckii* Hektoen et Perkins, 1900 (syn. *Sporotrichum beurmanni* Matruchot et Ramond). The isolate was more yeast-like and produced numerous budding cells and conidia laterally from the hyphae. Matruchot suggested the name *Sporotrichum gougerotii* (as *gouteroti*) for this variant, but did not formally propose a new species.

In 1928, Langeron (17) recovered a dematiaceous hyphomycete from a mycetoma of the foot. He characterized the fungus as producing toruloid hyphae that fragmented into arthrospores with blastospores developing solitarily or in clusters from the hyphae and the tips of short lateral branches. He named the fungus *Torula jeanselmei* Langeron.

Later, Dodge (12) transferred *T. jeanselmei* to *Pullularia* Berkhout as *P. jeanselmei* (Langeron) Dodge, 1935. Dodge stated, "I have hesitated to place this species in *Pullularia* but it apparently has blastospores as well as chlamydospores." Emmons (14), while studying an isolate of *T. jeanselmei* recovered from a mycetoma of the hand, observed occasional phialides with collarettes in addition to the structures noted by Langeron. Emmons felt that this species should be transferred to the genus *Phialophora* Medlar and proposed the new combination *P. jeanselmei* (Langeron) Emmons, 1945.

Borelli (5) obtained a subculture of a fungus isolated by Young and Ulrich (28) that was identified by them as *S. gougerotii* (confirmed by Dodge and Gougerot). Borelli observed unspecialized phialides without collarettes and then sent the culture to Gougerot, who confirmed that it was typical of what he had isolated in 1907 and given to Matruchot. Borelli designated this culture as the neotype to replace Matruchot's lost culture and compared it with isolates of *P. jeanselmei* and *Hormiscium dermatitidis* Kano. Borelli (4,5) concluded that the three were conspecific and proposed the new combination *Phialophora gougerotii* (Matruchot) Borelli, 1955.

Later, Carrión and Silva (7) reviewed the *"gougerotii"* problem and described the following four types of sporulation: (a) *Cladosporium*-like, i.e. with ovoid or barrel-shaped spores in chains that may branch, (b) phialides, i.e. elongate, swollen and sometimes bottle-shaped conidiogenous cells without collarettes, (c) *Pullularia*-like, i.e. clusters of conidia along the sides and tips of fertile hyphae and (d) budding yeast-like cells and pseudohyphae. These investigators felt the "black yeasts" were related to *Cladosporium* and proposed the new combination *Cladosporium gougerotii* (Matruchot) Carrión and Silva, 1955.

Setliff (24) has agreed in part with Borelli's conclusion that *P. jeanselmei* and *P. gougerotii* are conspecific and that *P. gougerotii* has priority. In contrast, Emmons (15) and Nielsen et al. (22) believe *P. jeanselmei*, *P. gougerotii* and *H. dermatitidis* are distinct and valid species of *Phialophora*. Cooke (10) reviewed the problem and concluded that *P. jeanselmei* and *P. gougerotii* were conspecific, but *P. jeanselmei* was the proper binomial for

for this fungus. No reasons were given for his conclusions.

Wang (27) and Setliff (24) have demonstrated that the conidiogenous cells of *P. jeanselmei* are annellides, thereby showing that this fungus is not a species of *Phialophora*. Emmons (15) disagreed and suggested that Wang's isolates were not *P. jeanselmei* but rather *P. gougerotii*. Shortly after Wang's study, Nielsen et al. (22) described rare phialides with collarettes in an isolate of *P. jeanselmei* recovered from a mycetoma. As a result, Nielsen et al. concluded that Emmons was correct and that *P. jeanselmei* belongs in the genus *Phialophora*.

In 1934, Nannfeldt (21) described a new hyphomycete from wood pulp as *Trichosporium heteromorphum* Nannfeldt. This fungus is initially yeast-like, becoming mycelial with age and then producing conidia from phialides and the hyphae. After studying *T. heteromorphum*, Mangenot (18) proposed the new combination *Margarinomyces heteromorpha* (Nannfeldt) Mangenot, 1952. Upon additional study, Cooke (11) reported that Mangenot's isolate was probably a mixed culture and concluded that *P. jeanselmei* was present in addition to *T. heteromorphum*.

Wang (26) investigated the *Trichosporium-Margarinomyces* problem and observed additional sporulation types in *T. heteromorphum* that had not been observed by Nannfeldt. She observed phialides with collarettes and collarettes on the hyphae and sclerotial bodies. Wang proposed the new combination *Phialophora heteromorpha* (Nannfeldt) Wang, 1964 and concluded that *Margarinomyces heteromorpha* (Nannfeldt) Mangenot sensu Mangenot was conspecific with *P. jeanselmei*, thus supporting Cooke in part. Setliff (24) reviewed Wang's isolates and concluded that *Phialophora heteromorpha* was conspecific with *P. jeanselmei*. In addition, Setliff considered CBS strain 101.67 (Schol-Schwarz sub *Rhinocladiella mansonii* (Castellani) Schol-Schwarz, 1968) to be *P. jeanselmei*. In her revision of *Rhinocladiella* Nannfeldt, Schol-Schwarz (23) listed *P. jeanselmei* as a synonym of *R. mansonii*.

In 1949, Langeron (1) established the new taxon *Torula bergeri* Langeron for a yeast-like fungus isolated from a case of phaeohyphomycosis. Trejos (25) studied *T. bergeri* and found the fungus to be identical with *P. jeanselmei*.

This conclusion has been supported by Cooke (10,11), Schol-Schwarz (23) and Setliff (24). In contrast, Emmons (15) feels that *T. bergeri* and *P. dermatitidis* are conspecific, not *T. bergeri* and *P. jeanselmei.*

Thus, the proper disposition of *T. jeanselmei* has remained unsettled (Table I). This investigation was undertaken to critically evaluate conidium ontogeny of *T. jeanselmei* and to determine its proper taxonomic disposition.

TABLE I. HISTORY OF THE TAXONOMY OF *EXOPHIALA JEANSELMEI.*

A. *Sporotrichum gougerotii* (as *gougeroti*) Matruchot, 1910.
  1910: *Sporotrichum gougerotii* suggested for a variant of *Sporothrix schenckii* (19). Original culture lost.
  Current: *S. gougerotii* considered later syn. of *Sporothrix schenckii.*

B. *Torula jeanselmei* Langeron, 1928.
  1928: *Torula jeanselmei* described (17).
  1935: New comb. *Pullularia jeanselmei.* Type studied (12).
  1945: New comb. *Phialophora jeanselmei.* Type studied (14).
  1955: *P. jeanselmei* considered later syn. of *S. gougerotii.* New comb. *P. gougerotii.* Types not studied (5).
  1955: *P. jeanselmei* considered later syn. of *S. gougerotii. Hormiscium dermatitidis* considered later syn. of *P. gougerotii.* Neotype of *P. gougerotii* and type of *H. dermatitidis* studied (4).
  1955: New comb. *Cladosporium gougerotii.* Neotype studied (7).
  1962: *P. gougerotii* considered later syn. of *P. jeanselmei.* Types studied (10).
  1966: *P. jeanselmei, P. gougerotii* and *H. dermatitidis* considered distinct species. Types studied (15).
  1968: *P. jeanselmei* considered later syn. of *Rhinocladiella mansonii.* Types studied (23).
  Current: New comb. *Exophiala jeanselmei. P. gougerotii* sensu Borelli misidentified strain of *E. jeanselmei. H. dermatitidis* and *R. mansonii* are distinct species.

C. *Trichosporium heteromorphum* Nannfeldt, 1934.
1934: *Trichosporium heteromorphum* described (21).
1952: New comb. *Margarinomyces heteromorpha.* Type studied (18).
1962: *M. heteromorpha* considered later syn. of *P. jeanselmei.* Type of *P. jeanselmei* studied (10).
1962: *M. heteromorpha,* excluding *T. heteromorphum,* considered later syn. of *P. jeanselmei.* Types studied (11).
1964: *M. heteromorpha* sensu Mangenot considered later syn. of *P. jeanselmei.* New comb. *P. heteromorpha* for *T. heteromorphum* sensu Nannfeldt. Paratype of *T. heteromorphum* studied (26).
1971: *P. heteromorpha* considered later syn. of *P. jeanselmei.* Types studied (24).
Current: *M. heteromorpha* considered later syn. of *E. jeanselmei. P. heteromorpha* considered distinct species.

D. *Torula bergeri* Langeron, 1949.
1949: *Torula bergeri* described (1).
1953: *T. bergeri* considered later syn. of *P. jeanselmei.* Type probably studied (25).
1966: *T. bergeri* considered later syn. of *H. dermatitidis.* Types studied (15).
Current: *T. bergeri* considered later syn. of *E. jeanselmei. H. dermatitidis* considered distinct species.

TAXONOMIC PART

Utilizing bright field, phase-contrast, and scanning electron (unpublished data from Cole) microscopy, we have confirmed Wang's observations (27) that the conidia of *T. jeanselmei* arise from annellides. Phialides with collarettes were not observed by us in any isolate studied. *Exophiala* Carmichael (6) is the only dematiaceous hyphomycete characterized by the production of conidia that accumulate in balls at the tips of annellides. Therefore, we propose the new combination *Exophiala jeanselmei.*

Exophiala jeanselmei (Langeron) McGinnis et Padhye, comb. nov. (Figs. 1-5).

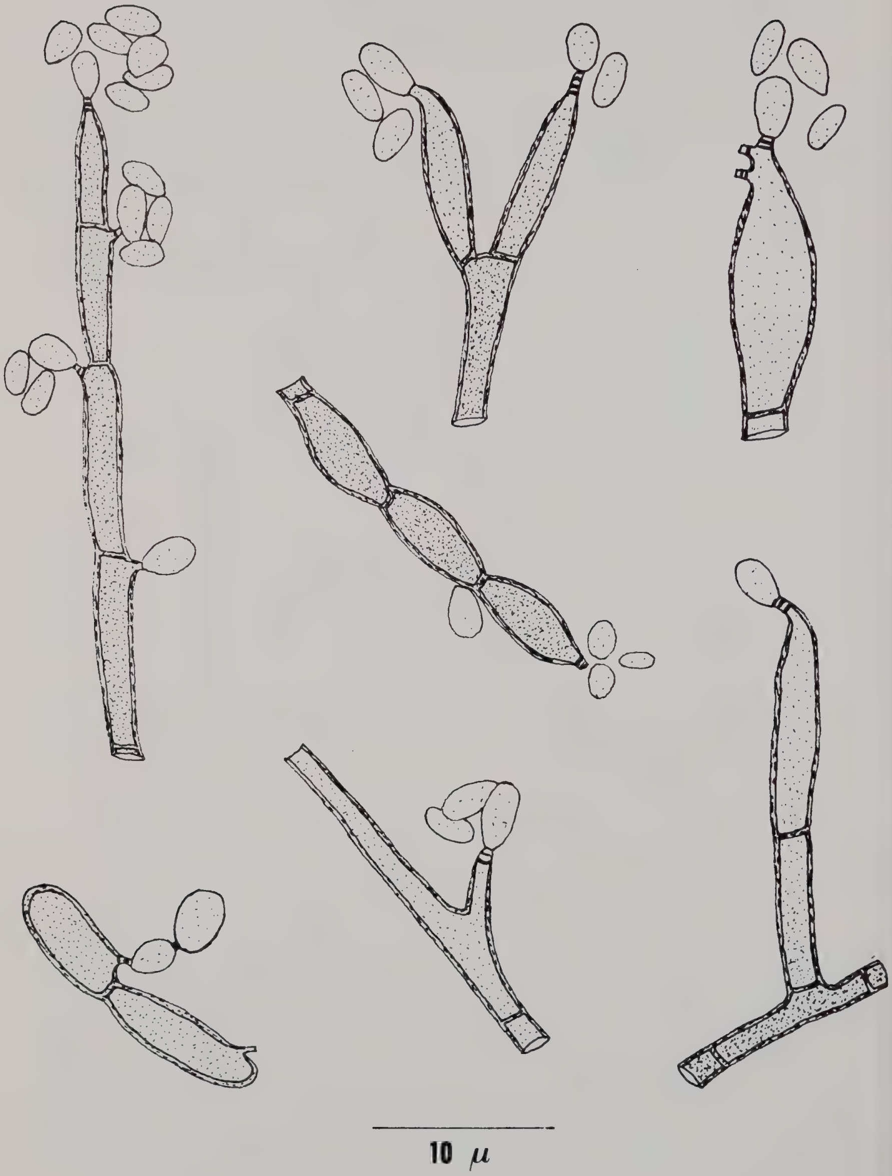


Figure 1. *Exophiala jeanselmei*. Conidiophores and conidia.

≡ *Torula jeanselmei* Langeron, Ann. Parasitol. Hum. Comp. 6:385-403, 1928.

  ≡ *Pullularia jeanselmei* (Langeron) Dodge, Medical Mycology, p. 675, 1935.

  ≡ *Phialophora jeanselmei* (Langeron) Emmons, Arch. Pathol. 39:364-368, 1945.

= *Torula bergeri* Langeron, Ann. Parasitol. Hum. Comp. 24:574-598, 1949.

Margarinomyces heteromorpha (Nannfeldt) Mangenot sensu Mangenot, Lib. Gén. l'Enseignement, Paris, p. 115, 1952, an *Phialophora heteromorpha* (Nannfeldt) Wang, Can. J. Bot. 42:1015, 1964.

Phialophora gougerotii (Matruchot) Borelli sensu Borelli, Mem. del VI. Con. Venez. Cient. Med. 5:2945-2971, 1955, pro parte, non *Sporotrichum gougerotii* (as *gougeroti*) Matruchot, Compt. Rend. Acad. Sci. (Paris) 150:543-545, 1910.

Rhinocladiella mansonii (Castellani) Schol-Schwarz sensu Schol-Schwarz, Antonie van Leeuwenhoek 34:122, 1968, pro parte, non *Microsporum mansonii* (as *Microsporon mansoni*) Castellani, Brit. Med. J. 2:1271, 1905, nom. dub.

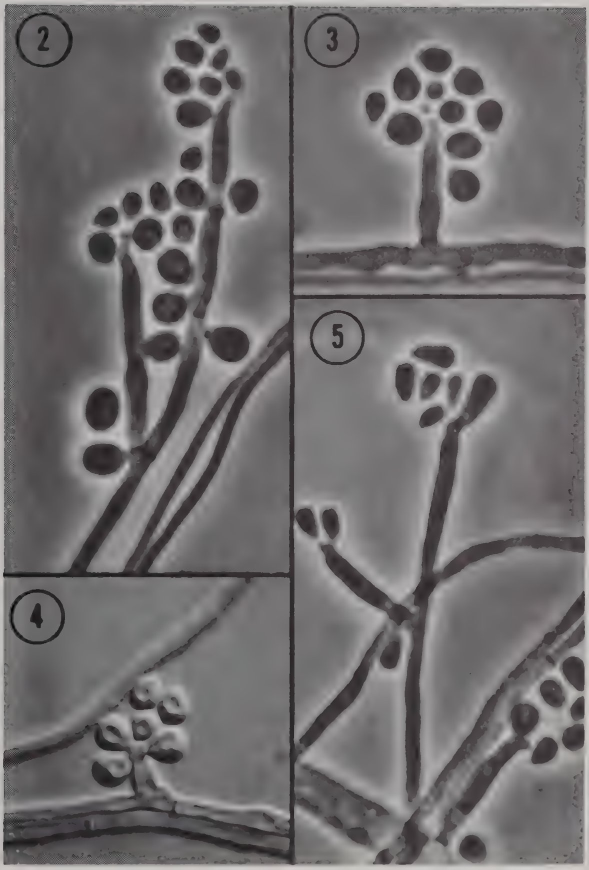
Initially, colonies may be yeast-like and black, gradually becoming effuse, raised or dome-shaped, 2-2.5 cm in diam. After 14 days at 30°C on Sabouraud dextrose agar (2% dextrose), colonies are covered with short aerial velvety hyphae. Coloration is mouse grey, olive grey to iron grey, with an olivaceous black reverse color. Growth is present at 37°C on potato dextrose agar and V-8 juice agar. Mycelium is superficial, partly immersed, cylindrical to toruloid, septate, branched, smooth-walled and pale brown. Conidiophores are semi-macronematous, mononematous, branched or unbranched, smooth-walled and pale brown. Conidiogenous cells are either: integrated, 1.0-3.1 x 5.0-19.1 (average 1.7 x 12.5) μm, with the annellations arising next to a septum, terminal, 0.9-3.0 x 5.0-19.8 (average 1.9 x 9.8) μm, or as thick-walled chlamydoconidia-like cells which are variable in size and shape. Conidiogenous cells are monoblastic, rarely polyblastic, percurrent, closely annellated, cylindrical, obclavate or lageniform, smooth-walled and pale brown to almost black in color. Conidia aggregate in masses which tend to slide down the conidiophore or along the hypha. Conidia are exogenous, non-septate, subglobose, ellipsoidal to cylindrical, smooth-walled, hyaline and 0.9-2.9 x 1.0-5.0 (average 1.5 x 2.8) µm. Yeast-like cells with blastoconidia typically present.

Habitat: cosmopolitan, occasional pathogen of man.

Type: ATCC 34123.

Material examined: As "*jeanselmei*": ATCC 34123, mycetoma (type); ATCC 10224, mycetoma; CDC B-53, finger abscess; CDC B-1003, mycetoma; Duke 3349, leg; Duke 766, lung abscess; Duke 3348, buttock; Duke 2939, neck; Duke 2533, lung secretion; Duke 3419, mycetoma; Duke 2539, bronchial aspirate; Gordon G302C, unknown clinical material; UAMH 2034, laboratory contaminant; UAMH 1207, cedar cooling tower; Wang 318, pulp suspension; Wang 102, pulp suspension. As "*gougerotii*": Wang 1040 (Young's isolate), subcutaneous cyst (neotype); NIH 8738, bone; Duke 3454, wound abscess. As "*dermatitidis*": CDC B-1259, lung; Duke 3377, oral mucosa. As "*bergeri*": CBS 351.52, skin (type). As *Margarinomyces heteromorpha*: Emmons E7850, polluted water; Mangenot M12, wood. As *Trichosporium heteromorphum*: DAOM 36487 (slide), from white water, Hellefors, Västmanland, Sweden (paratype); DAOM 40841 (slide), from white water, Sofiehems, Västerbotten, Sweden (paratype); DAOM 49117 (slide), from white water, Sofiehems, Västerbotten, Sweden; DAOM 49118, (slide), from white water, Vaplans, Jämtland, Sweden; DAOM 49119 (slide), from white water, Hellefors, Västmanland, Sweden; DAOM 49120 (slide), from Lulea, Norrbotten, Sweden; DAOM 75731, railway tie.

Figures 2-5. *Exophiala jeanselmei* (ATCC 34123). Fig. 2. Integrated annellides with annelloconidia. Fig. 3. Monoblastic annellated conidiogenous cell with annelloconidia in a ball. Fig. 4. Polyblastic annellated conidiogenous cell with annelloconidia. Fig. 5. Mono- and polyblastic annellated conidiogenous cells with annelloconidia in balls. Fig. 4. In Nomarski differential interference contrast; the others in phase-contrast. 2720x.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DISCUSSION

Much of the confusion surrounding *E. jeanselmei* has resulted from its misidentification as *Sporotrichum gougerotii*. Matruchot (19) clearly stated that he considered *S. gougerotii* to be a stable variant of *Sporothrix schenckii*, a well recognized pathogen of the early 1900's. Additional confusion has resulted from the use of fungal morphology in tissue (15) as the primary characteristic to distinguish *E. jeanselmei* and *Sporotrichum gougerotii* sensu Borelli. The production of granules in tissue by *E. jeanselmei* has been used as the primary basis for separating these two species. In our opinion, the ontogeny and morphology of conidia must be the principle basis of distinguishing taxa, not the morphology in tissue or host response to the presence of organisms. We consider *Exophiala* to be the most suitable generic disposition for *Torula jeanselmei* and that *Sporotrichum gougerotii* is a later synonym of *Sporothrix schenckii*. *Torula jeanselmei* cannot be accommodated in *Torula* whose type species, *T. herbarum* is based upon an entirely different kind of hyphomycete with a different kind of conidium ontogeny (2,13).

Exophiala bears a similarity to several genera of dematiaceous hyphomycetes, i.e. *Phialophora*, *Margarinomyces* Laxa and *Wangiella* McGinnis (9,16,20), but differs significantly in its method of conidium ontogeny. Cole (8) has recently reported that the conidiogenous cells of *Exophiala* are phialides. After reviewing figures 15-19 and a subculture of B-1228 which he investigated, it must be concluded that Cole apparently did not have *E. salmonis* Carmichael. Our observations support the conclusion of Carmichael (personal communication) and Wang (27) that *Exophiala* produces annellides.

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WANGIELLA, A NEW GENUS TO ACCOMMODATE *HORMISCIUM DERMATITIDIS*

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ABSTRACT

The new genus *Wangiella* McGinnis is proposed for the dematiaceous hyphomycete originally invalidly published as *Hormiscium dermatitidis* Kano and subsequently placed in the genera *Fonsecaea, Hormodendrum* and *Phialophora*. *Wangiella dermatitidis* McGinnis sp. nov. is described.

INTRODUCTION

In 1937, Kano (20) described a dematiaceous hyphomycete isolated from a patient with chromomycosis as *Hormiscium dermatitidis* Kano. The fungus was characterized by the production of chains of arthrospores from which budding occurred. *H. dermatitidis* was published without a Latin diagnosis and must therefore be rejected as it contravenes Article 36 of the International Code of Botanical Nomenclature. This violation of the Code has apparently gone unnoticed by many of the subsequent workers.

Carrión (6) studied Kano's isolate and proposed the new combination *Fonsecaea dermatitidis* (Kano) Carrión, 1950. The new combination was based upon the fungus being an agent of chromomycosis and possessing *Acrotheca*-like, *Cladosporium*-like, *Phialophora*-like and *Pullularia*-like sporulation. Later, Conant (11) transferred *F. dermatitidis*

to the genus *Hormodendrum* as *H. dermatitidis* (Kano) Conant, 1953. The publication date for this new combination is in error and was actually 1954 (12). Since the new combination was not proposed in compliance with the Code, it must be rejected as it contravenes Article 33.

Borelli (2) placed *Hormiscium dermatitidis* in synonymy with *Phialophora gougerotii* (Matruchot) Borelli, 1955. The neotype strain of *P. gougerotii* is apparently a misidentified isolate of *Exophiala jeanselmei* (Langeron) McGinnis et Padhye (21). Cooke (13) disagreed with Borelli and considered *H. dermatitidis* and *Aureobasidium mansonii* (Castellani) Cooke, 1962 to be conspecific.

Emmons (16) restudied Kano's isolate and proposed the new combination *Phialophora dermatitidis* (Kano) Emmons, 1963. Emmons made the new combination because of the similarity between the phialides of *H. dermatitidis* and *P. verrucosa* Thaxter.

While studying *Rhinocladiella* Nannfeldt, Schol-Schwarz (27) considered *H. dermatitidis* and *R. mansonii*(Castellani) Schol-Schwarz to be conspecific. This treatment has not been widely accepted (3,8). Recently, Butterfield and Jong (3) reexamined Kano's isolate and concluded that *Fonsecaea dermatitidis* is the proper binomial for this organism.

Reevaluation of Kano's isolate in light of current generic concepts in the hyphomycetes, indicates that a new genus is needed to accommodate this organism.

TAXONOMIC PART

Wangiella gen. nov.

Deuteromycotina, Hyphomycetes.

(Etym. after Dr. C.J.K. Wang, Mycologist)

Mycelium cylindricum usque toruloideum, glabrum pallide brunneum; conidiophora semi-macronemata usque micronemata, ramosa vel eramosa, glabra pallide brunnea; cellulae conidiogenae monophialidicae vel rare polyphialidicae, ecollariatae terminales vel integratae, lageniformes vel ampulliformes, cylindricae obclavatae glabrae; conidia eseptata,

subglobosa usque obovoidea, in caespites aggregata; cellulae fermentoideae typice praesentes.

Species typica: *Wangiella dermatitidis* McGinnis.

Mycelium cylindrical to toruloid, smooth, pale brown. Conidiophores semi-macronematous to micronematous, branched or unbranched, smooth, pale brown. Conidiogenous cells monophialidic, rarely polyphialidic, without collarette, terminal or integrated, lageniform or ampulliform, cylindrical, obclavate, smooth. Conidia non-septate, subglobose to obovoid, aggregate in clusters. Yeast-like cells typically present.

Wangiella dermatitidis McGinnis, sp. nov. (Figs. 1,2).

Auctus in mediis culturae omnibus tardus, ad temperaturam 37°C praesens; coloniae post 14 dies ad temperaturam 30°C in agaro solani 12-15 mm diam, ex hyphis brevibus aereis tectae, olivaceo-griseae, reverso ferreo-griseo; mycelium superficiale ex parte immersum, cylindricum usque toruloideum, septatum ramosum glabrum pallide brunneum; conidiophora semi-macronemata usque micronemata, ramosa vel eramosa, glabra pallide brunnea; cellulae conidiogenae monophialidicae vel rare polyphialidicae ecollariatae terminales discretae vel integrata, 2.1 - 5.0 x 4.5 - 11.0 (mediae 2.9 x 7.8)µm, lageniformes vel ampulliformes, cylindricae obclavatae glabrae pallide brunneae; conidia eseptata subglobosa usque obovoidea, 2.0 - 3.9 x 2.5 - 6.1 (mediae 2.7 x 3.8)µm, glabra hyalina, ad apices phialidium in caespites aggregata vel secundum conidiophora dis posita; cellulae fermentoideae subglobosae usque late ellipsoideae, in magnitudine variabiles, typice blastoconidia gignentes, cellulis parvis tenuitunicatis hyalinisque, magnis crassitunicatis et pallide brunneis.

Holotypus: Isolated from a case of chromomycosis, Japan, CBS 207.35. Dried material has been sent to the University of Alberta Mold Herbarium and Culture Collection, Edmonton, Alberta, Canada and the New York Botanical Garden, Bronx, New York, USA.

Growth on all media is slow. After 14 days at 30°C on potato dextrose agar, colonies are covered with short aerial hyphae and are 12-15 mm in diameter. Coloration is olivaceous grey with an iron grey reverse. Growth is present at

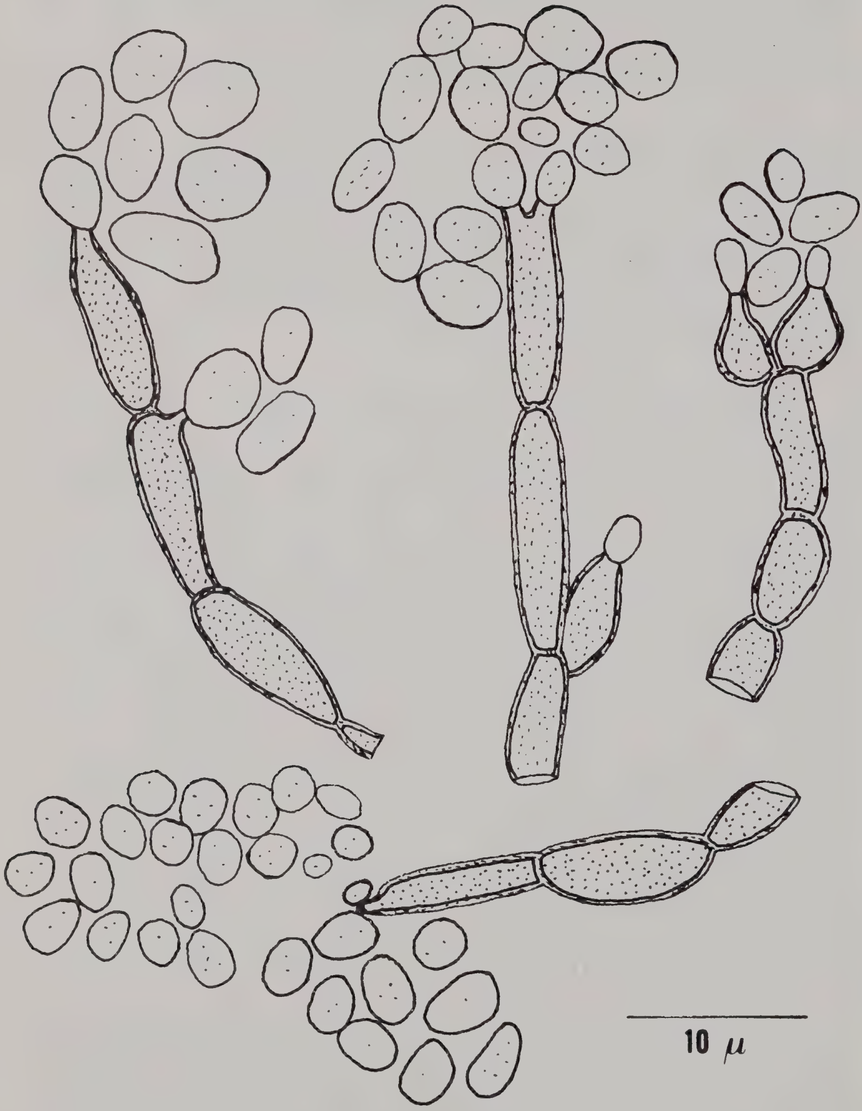

Figure 1. *Wangiella dermatitidis*. Conidiophores and conidia. CBS 207.35.

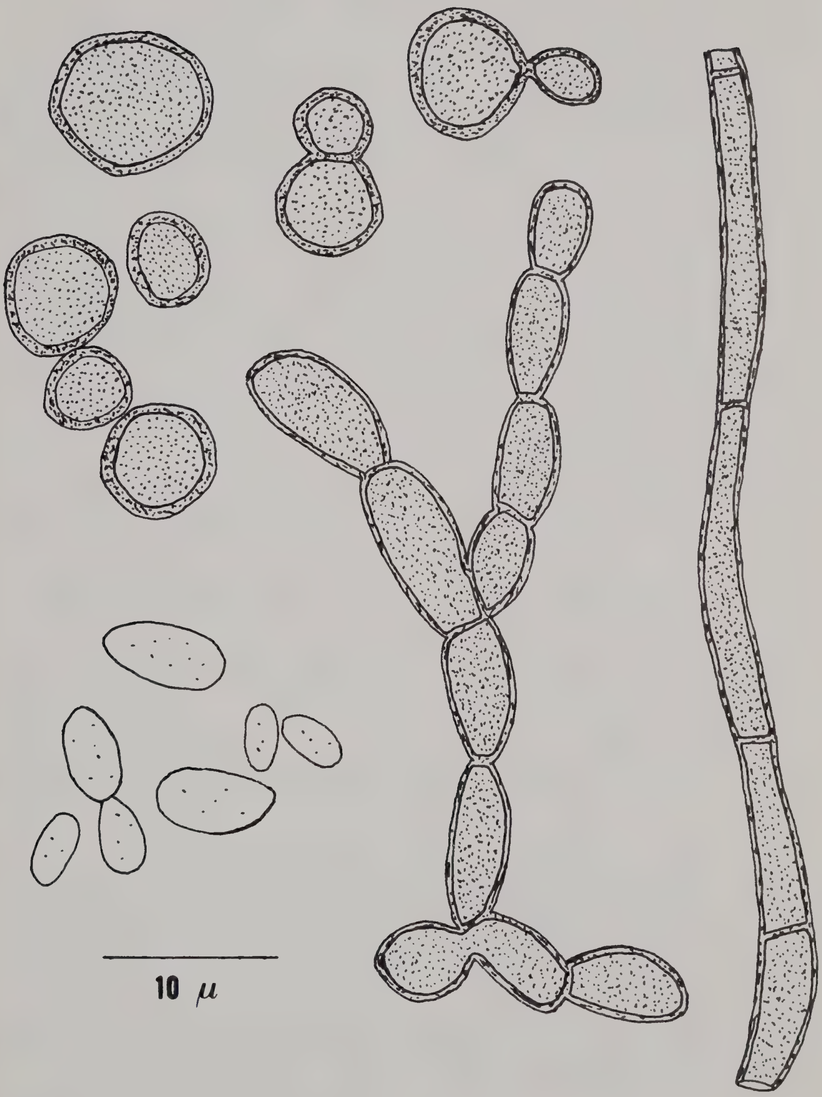

Figure 2. *Wangiella dermatitidis*. Yeast-like cells and hyphae. CBS 207.35.

37°C. Mycelium is superficial, partly immersed, cylindrical to toruloid, septate, branched, smooth, pale brown. Conidiophores are semi-macronematous to micronematous, branched or unbranched, smooth, pale brown. Conidiogenous cells are monophialidic, rarely polyphialidic, without collarette, terminal, discrete or integrated, 2.1 - 5.0 x 4.5-11.0 (average 2.9 x 7.8)µm, lageniform or ampulliform, cylindrical, obclavate, smooth, pale brown. Conidia are non-septate, subglobose to obovoid, 2.0 - 3.9 x 2.5 - 6.1 (average 2.7 x 3.8)µm, smooth, hyaline, aggregating in clusters at the apex of phialides and/or along the conidiophores. Yeast-like cells subglobose to broadly ellipsoidal, variable in size, typically producing blastoconidia. Small yeast-like cells thin-walled and hyaline. Large yeast-like cells thick-walled and light brown.

Wangiella dermatitidis McGinnis

≡ *Hormiscium dermatitidis* Kano, Arch. Dermatol. Syph. (Berlin) 176:288-294, 1937, nom. nud.

≡ *Fonsecaea dermatitidis* (Kano) Carrión, Arch. Dermatol. Syph. (Chicago) 61:996-1008, 1950.

≡ *Hormodendrum dermatitidis* (Kano) Conant, Manual of Clinical Mycology, p. 276, 1954 (as 1953).

≡ *Phialophora dermatitidis* (Kano) Emmons, Medical Mycology, p. 291, 1963.

Aureobasidium mansonii (Castellani) Cooke sensu Cooke, Mycopathol. Mycol. Appl. 17:34, 1962, pro parte, non *Microsporum mansonii* (as *Microsporon mansoni*) Castellani, Brit. Med. J. 2:1271, 1905, nom. dub.

Phialophora gougerotii (Matruchot) Borelli sensu Borelli, Mem. del VI. Con. Venez. Cient. Med. 5:2945-2972, 1955, pro parte, non *Sporotrichum gougerotii* (as *gougeroti)* Matruchot, Compt. Rend. Acad. Sci. (Paris) 150:543-545, 1910.

Rhinocladiella mansonii (Castellani) Schol-Schwarz sensu Schol-Schwarz, Antonie van Leeuwenhoek 34:122, 1968, pro parte, non *Microsporum mansonii* (as *Microsporon mansoni*) Castellani, Brit. Med. J. 2:1271, 1905, nom. dub.

Material examined: Type, CBS 207.35 (Duke 2400), skin lesion; Duke 3381, lymph node; Duke 3358, sputum; G 243A, pathologic material; Duke 3379, brain; Duke 3355, blood; Duke 3378, oral mucosa, IHM 1762, soil; Duke 3326, finger; Emmons 8656, labelled as Toshi strain.

DISCUSSION

Cooke (13) and Schol-Schwarz (27) considered Kano's isolate and the fungus originally described as *Microsporum mansonii* (as *Microsporon mansoni*) Castellani (9) to be conspecific. Figure 4 in Schol-Schwarz's study of *Rhinocladiella* (27), which illustrates the type strain of *M. mansonii* (CBS 158.58), clearly indicates that these two fungi are not conspecific. The original description of *M. mansonii* (9) appears to be based upon *Pityrosporum orbiculare* Gordon. *M. mansonii* is therefore a nomen dubium.

Wangiella dermatitidis was originally believed (20) to be a species of *Hormiscium* Kunze, which is now considered (19) congeneric with *Torula* (Pers.) Link. *T. herbarum* (Pers.) Link ex S.F. Gray, the type species for the genus, is characterized by the development of acropetal chains of multicelled blastoconidia which disarticulate following cytolysis within the conidiogenous cell (15). *Torula* cannot accommodate *W. dermatitidis* since its method of conidium ontogeny is entirely different.

It has been suggested (11) that *W. dermatitidis* could be accommodated in the genus *Hormodendrum* Bonorden. De Vries (14) placed *Hormodendrum* in synonymy with *Cladosporium* Link ex Fries, a hyphomycete Hughes (18) has classified in Section IA of his experimental classification system. *Cladosporium* produces chains of blastoconidia which develop in acropetal succession from the apex of the conidiogenous cell. *W. dermatitidis* produces blastoconidia, but not in acropetal chains.

Cooke (13) placed *W. dermatitidis* in the genus *Aureobasidium* Viala et Boyer. *Aureobasidium* has been characterized by Barron (1) as developing blastoconidia on denticles directly from pigmented vegetative hyphae. The phialoconidia and integrated phialides of *W. dermatitidis* are superficially similar to the blastoconidia and conidiogenous cells of *Aureobasidium.*

Rhinocladiella was established by Nannfeldt (22) to accommodate a dematiaceous hyphomycete isolated from wood pulp and described as *R. atrovirens* Nannfeldt. Nannfeldt described non-septate conidia which originated from a sympodial conidiogenous cell. Schol-Schwarz (27) examined material deposited at the Uppsala Herbarium labelled "paratypus" and the living original strain of *R. atrovirens* (CBS 317.33) and observed in addition to sympodial conidiogenous cells, phialides with collarettes and chlamydospores and yeast-like cells with annellations. In other strains, she noted short acropetal chains of blastoconidia similar to those of *Cladosporium.* Schol-Schwarz emended the genus *Rhinocladiella* to include sympodial conidiogenous cells, phialides with collarettes, closely percurrent annellated conidiogenous cells and blastoconidia developing in acropetal chains. In addition to emending *Rhinocladiella,* she considered *Fonsecaea* to be a later synonym. *Rhinocladiella* cannot accommodate *W. dermatitidis,* a hyphomycete characterized by phialides without collarettes.

Negroni (23) established the genus *Fonsecaea* to accommodate the polymorphic hyphomycete *Hormodendrum pedrosoi* Brumpt. *Fonsecaea* was characterized as an agent of chromomycosis with simple or septate dematiaceous yeast-like cells in host tissue, hyphae which may develop nodular organs in culture, acropetal chains of blastoconidia and conidia which develop on a verrucose sympodial conidiogenous cell. Several months later, Negroni (24) emended the Latin diagnosis of the genus, but did not significantly change his generic concept. Independent of Negroni, Carrión and Emmons (7) observed phialides with collarettes in a strain of *H. pedrosoi* in addition to the typical acropetal chains of blastoconidia and conidia developing from a verrucose sympodial conidiogenous cell. These authors (17) redescribed *H. pedrosoi*, and later, Carrión (5) substituted the revised species concept of *H. pedrosoi* (17) for the generic concept of *Fonsecaea* without emending the generic description. Carrión (6) then transferred *Hormiscium dermatitidis* to *Fonsecaea* as *F. dermatitidis* (Kano) Carrión. He stated that "...Kano's organism may be admitted into the group by further emending the concept of the genus to include species showing supplementary characteristics of the

Pullularia type." No formal emendation of *Fonsecaea* was done. Neither *Fonsecaea* nor *Fonsecaea* sensu Carrión can accommodate *W. dermatitidis* since these organisms produce entirely different types of conidiogenous cells.

Wangiella bears a similarity to *Phialophora* Medlar and *Exophiala* Carmichael, but differs significantly in its method of conidium ontogeny. Oujezdsky and Szaniszlo (26) have demonstrated, and this investigation confirms, that the conidia of *W. dermatitidis* arise from phialides without collarettes. *Phialophora* is characterized by phialides which are typically constricted at their necks and terminate in a collarette (10). In contrast to *Phialophora* and *Wangiella*, *Exophiala* produces annellides (4,21,29).

Much of the confusion surrounding *W. dermatitidis* is a result of its polymorphic nature. Acid conditions tend to inhibit blastoconidium emergence from the yeast-like cells without inhibiting growth, nuclear division or cytokinesis. Such growth results in simple or septate, dematiaceous, thick-walled cells (28). Oujezdsky et al. (25) have demonstrated that only thick-walled yeast-like cells give rise to moniliform hyphae, which in turn develop into true hyphae. Butterfield and Jong (3) found that different carbon sources affect cell size, pigmentation and morphological form. Glucose or maltose enhances phialide development; erythritol enhances growth of yeast-like cells; L-arabinose enhances development of blastoconidia; and galactose, melibiose or L-sorbose enhances development of moniliform hyphae.

W. dermatitidis is intermediate between *Phialophora* and *Exophiala*. The principal conidiogenous cells of *Wangiella*, *Phialophora* and *Exophiala* are phialides without collarettes, phialides with collarettes and annellides, respectively. The justification for establishing a new genus for this organism is therefore evident.

ACKNOWLEDGEMENTS

The author wishes to express his appreciation to Drs. M.B. Ellis, Libero Ajello and Paul Szaniszlo for their comments concerning taxonomy; Drs. Donald Rogers and Jimmy Massey for nomenclatural advice; Drs. Donald Rogers and Lindsay Olive for reviewing the manuscript; Dr. Edith

Cash for translating the English descriptions into Latin; and Jane Pfister for secretarial assistance.

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MYCOTAXON

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REVUE DES LIVRES

G. L. HENNEBERT

Book Review Editor, Huttelaan 36, B-3030 Heverlee, Belgium

THE CORTICIACEAE OF NORTH EUROPE, par John ERIKSSON et Leif RYVARDEN. VOL. 4. HYPHODERMELLA - MYCOACIA, p. 547-886, figs. 257-446, broché, 1976. Editions Fungiflora, Blindernveien 46c Oslo-3, Norvège. Prix: vol. 4: Nkr 100.oo, US $20.oo.

Ce quatrième volume nous offre un nouveau lot de descriptions et de notes taxonomiques sur 30 genres et 79 espèces de Corticiacées du Nord de l'Europe. Voir MYCOTAXON, 4(1): 324, 1976. Le lecteur ne sera pas déçu: les descriptions sont d'une telle qualité qu'elles forcent l'intérêt et éveille le désir de la redécouverte de ces champignons. Les auteurs, qui éditent eux-mêmes leurs ouvrages, ont choisi une présentation des textes descriptifs, format, caractères, style, qui les rendent clairs et d'un usage facile. L'illustration est très abondante puisqu'elle couvre une page sur deux. 115 planches de pleine page dessinées au trait par John Eriksson et 131 photographies dont la moitié au SEM par Leif Ryvarden "montrent" ces champignons dans tous leurs détails. Trois genres nouveaux, Hyphodermella, Intextomyces et Merulicium, 3 espèces et 1 variété nouvelles et 17 recombinaisons d'espèces sont ici publiées. Ce volume sera suivi d'autres encore, ainsi que du premier volume à paraître en dernier lieu.

A FIELD GUIDE TO WESTERN MUSHROOMS, par Alexander H. SMITH, 280 p., 3 figs., 201 photogrs. col., 13.5x27 cm, cartonné, juin 1975. The University of Michigan Press, Ann Arbor, USA. Prix US $16.5o.

Ce guide écrit et illustré par un mycologue de réputation mondiale concerne particulièrement la mycoflore des régions à l'ouest et au nord des Grandes Prairies des Etats-Unis d'Amérique, y compris les Montagnes Rocheuses. L'auteur, qui a récolté en ces régions plus de 50.000 spécimens de champignons, a choisi de n'illustrer ici que 201 espèces typiques, dont 70 sont propres ou originellement connues de ces régions. Nombreux seront ceux qui se réjouiront à la consultation de ce guide, à cause du choix des espèces, dont beaucoup ne sont pas décrites dans d'autres guides, et de la méthode didactique de ses descriptions qui, quoique brèves, mettent en valeur les "field identification marks" que l'auteur, en homme d'expérience, a retenus.

ADVANCES IN MYCOLOGY AND LICHENOLOGY IN SOVIET PRIBALTICS, par A. RAITVIIR, Scripta Mycologica, no. 6, 159 p., 1974. Academy of Sciences of the Estonian SSR, Institute of Zoology and Botany, Tartu. Prix R 1.02.

Compte-rendu du 7e Symposium des Mycologues et Lichénologues de la Baltique, Parc National Laheema, Estonie, Sept. 1974. En russe.

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ELEMENTAL COMPOSITION OF METATRICHIA VESPARIUM SPORANGIA[1]

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SUMMARY

Fructifications of seventeen collections of Metatrichia vesparium (Batsch) Nann.-Brem. examined by energy dispersive x-ray spectrometry were found to contain high levels of calcium and manganese. Lower concentrations of silicon, phosphorus, sulphur, chlorine, potassium, iron and copper were less consistently present. The elemental composition of the stalk was more variable than that of the peridium. The taxonomic significance of the high levels of calcium in M. vesparium is discussed.

INTRODUCTION

The taxonomy of the Myxomycetes is based largely on the nature of the fructification, spore color and markings, structure of the capillitium, and presence or absence of calcareous deposits (Martin & Alexopoulos, 1969). The order Physarales contains Myxomycetes with visible deposits of lime within or on the fructification. Visible deposits in unknown chemical combinations containing calcium have been described in a few non-physaraceous genera. Small scale-like aggregations of crystalline lime are found in the base of the peridium of Leptoderma iridescens G. Lister, classified in the Stemonitales, and occasionally on the peridium of Perichaena chrysosperma (Currey) A. Lister,

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[1] Supported in part by National Science Foundation grant DMR-7504020 to R. W. Scheetz

P. corticalis (Batsch) Rost., and P. depressa Libert in the order Trichiales. A recent investigation has shown that two genera, Cribraria and Dictydium, in the order Liceales also contain calcium, in their dictydine granules (Schoknecht, 1975).

Calcium has not been demonstrated in fructifications of the two remaining orders of the Myxomycetes, the Ceratiomyxales, or the Echinosteliales. Limited information is available on the distribution of elements other than calcium in myxomycete fructifications. Schoknecht (1975) has reported the presence of phosphorus, silicon, sulphur, and chlorine in members of the Physaraceae, and traces of phosphorus in Didymium trachysporum G. Lister.

We have demonstrated the presence of calcium in fructifications of a number of non-physaraceous genera by energy dispersive x-ray spectrometry. The present report will describe our investigation of the elemental composition of fructifications of Metatrichia vesparium (Batsch) Nann.-Brem. (Trichiales).

METHODS

Mature sporangia of M. vesparium were obtained from seventeen specimens in the University of Texas Myxomycete Collection, UTMC (Table 1). Sporangia were individually mounted on aluminum stubs with metallic silver paint. Specimens were coated with carbon, and a thin film of palladium (40%) and gold (60%) in a Denton DV-502 high vacuum evaporator equipped with a tilting omni rotary shadow caster.

X-ray spectra of specific regions of specimens were obtained with a Kevex model 5100 energy dispersive x-ray spectrometer (detector resolution less than 152 eV) attached to an AMR 1000A scanning electron microscope. All x-ray data were collected with 200 sec. probes at a specimen tilt of 45. Spectra were obtained from the sporangial operculum, from the sporangial base, and from the stalk. Beam accelerating voltage was maintained at 30 Kv with a constant condenser lens setting and magnification in order to minimize discrepancies in signal. Minimum partial field settings were utilized in collecting data so that the exact area being analyzed was known. Background subtraction and peak smoothing functions were utilized to facilitate integration of elemental peaks.

Peaks representing aluminum, silver, gold, and palladium which were introduced during specimen preparation were subtracted from the spectra. Counts were recorded for each individual element as well as the total counts in the spectrum after background subtraction.

All data was normalized with respect to 125,216 counts, which was the highest figure obtained with a 200 sec. probe.

RESULTS

The overall elemental composition of the M. vesparium fructifications examined is shown in Table 1. The operculum and base of the sporangium had a similar elemental composition. An x-ray spectrum of the peridium prior to background subtraction is depicted in Figure 1.

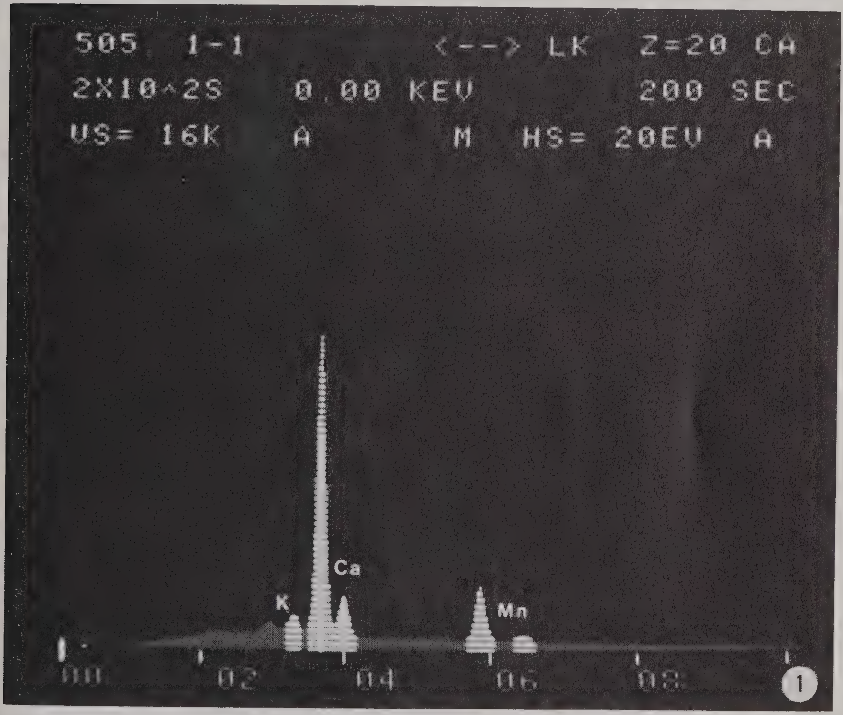


Figure 1. X-ray spectrum of the peridium of M. vesparium (UTMC 505) prior to background subtraction. Vertical scale 16 K.

Magnesium, silicon, phosphorus, sulphur, chlorine, potassium, and iron were sporadically present in low concentrations, usually less than 10,000 counts/200 sec.

TABLE 1

University of Texas Myxomycete collections of *M. vesparium* examined by energy dispersive x-ray spectrometry, their collection site, and overall elemental composition.

UTMC No.	Collection Site	Mg	Si	P	S	Cl	K	Ca	Mn	Fe	Cu
1822	Florida, Alachua County	-	X	-	X	X	-	X	X		
1357	Iowa, Iowa City	-	X		X	X	X	X	X	-	-
1666	Kentucky, Oldham County	X	X	-	X	X	X	X	X	X	-
2023	Kentucky, Oldham County	-	-	X	X	-	X	X	X		-
595	New Jersey, Cinnaminson	-	-			-	X	X	X	-	-
505	Texas, Big Thicket	X	-		X	-	X	X	X		-
1516	Texas, Bastrop State Park		X	X	X	-	X	X	X	X	X
2287	Texas, Big Thicket	-	-	-	-	-	X	X	X	-	-
2178	Texas, Hays County	-	X		X	-	X	X	X		X
1365	Costa Rica, Turrialba	-	X	X	X	X	X	X	X	X	
1366	Costa Rica, Univ. City		-	-	-	-	-	X			
1367	Costa Rica, Santa Ana	-	X	X	X	X	X	X	X	X	-
1386	Costa Rica, Coto 47					-	X	X	X		
363	Greece, Lailia Forest	-	-	-	-	-		X	X		
1914	Nicaragua, Indian River	-	X	-	X	X		X	X	X	-
1166	Quebec, Galt Estate	-	-	-	X	X	X	X	X		X
1096	West Indies, Dominica	-		-	-	-	X	X	X		X

X = Measurable levels; - = trace levels; blank space = not detected probe. Manganese was detected in the peridium of all but two of the collections examined. This element was generally present in higher concentrations than those listed above (Figures 2 and 3).

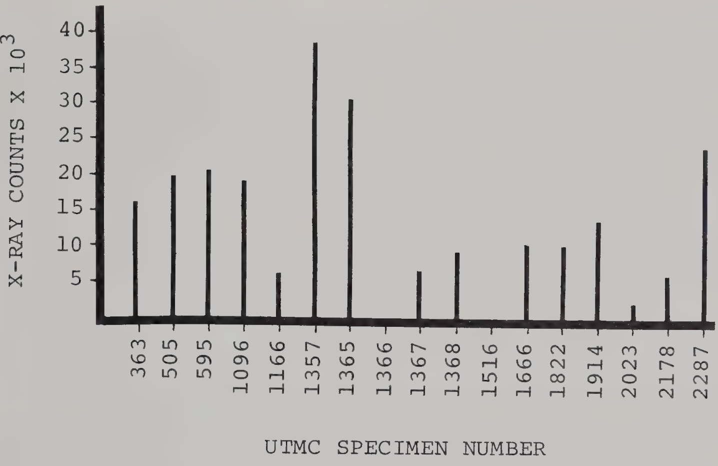


Figure 2. Normalized x-ray counts of manganese from the operculum of M. vesparium.

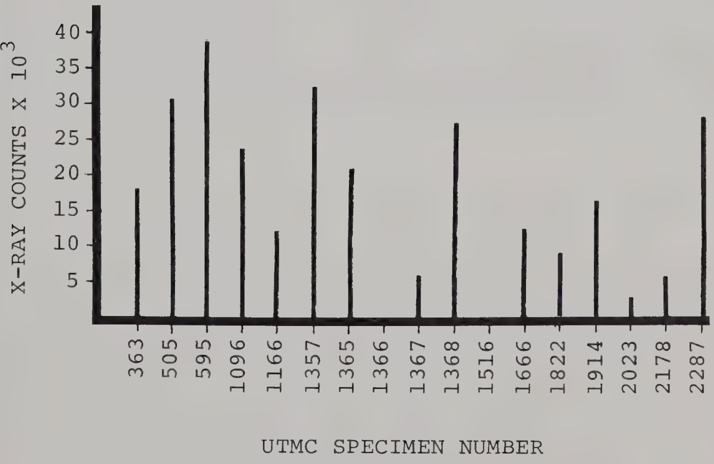


Figure 3. Normalized x-ray counts of manganese from the sporangial base of M. vesparium.

Calcium was present in every collection examined, in comparatively high concentrations. The operculum exhibited a range of 63,169 to 125,216 calcium counts/200 sec. probe, with a mean of 104,689 counts. The standard deviation was 14,038 counts (Figure 4).

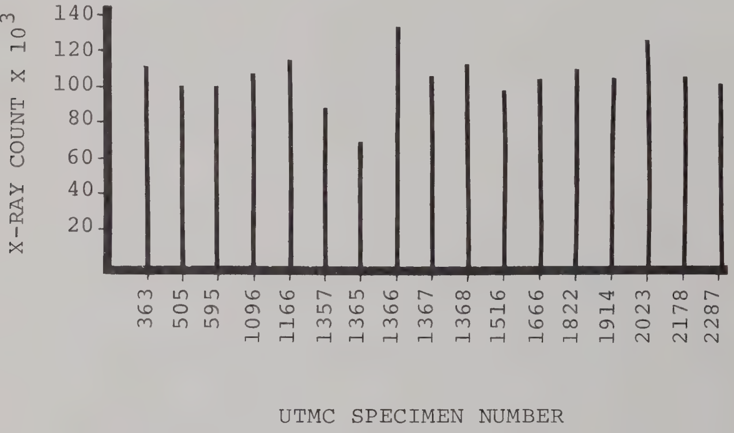


Figure 4. Normalized x-ray counts of calcium from the operculum of M. vesparium.

The base of the sporangium exhibited a range of 82,832 to 125,216 calcium counts/200 sec. probe, with a mean of 105,047 counts and a standard deviation of 12,936 counts (Figure 5).

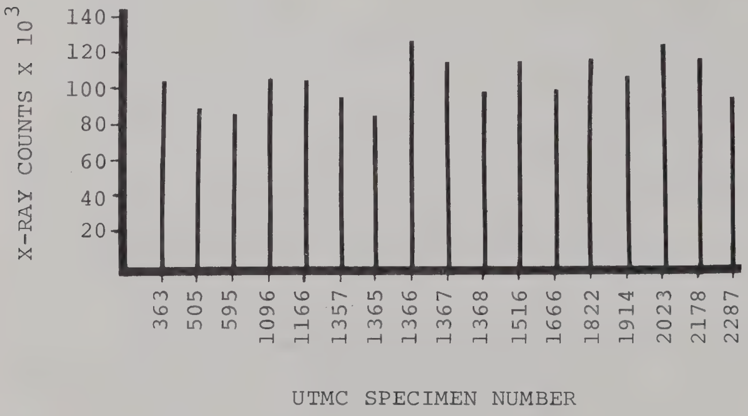


Figure 5. Normalized x-ray counts of calcium from the sporangial base of M. vesparium.

The stalk exhibited a somewhat different elemental composition than the peridium. An x-ray spectrum of this region prior to background subtraction is depicted in Figure 6.

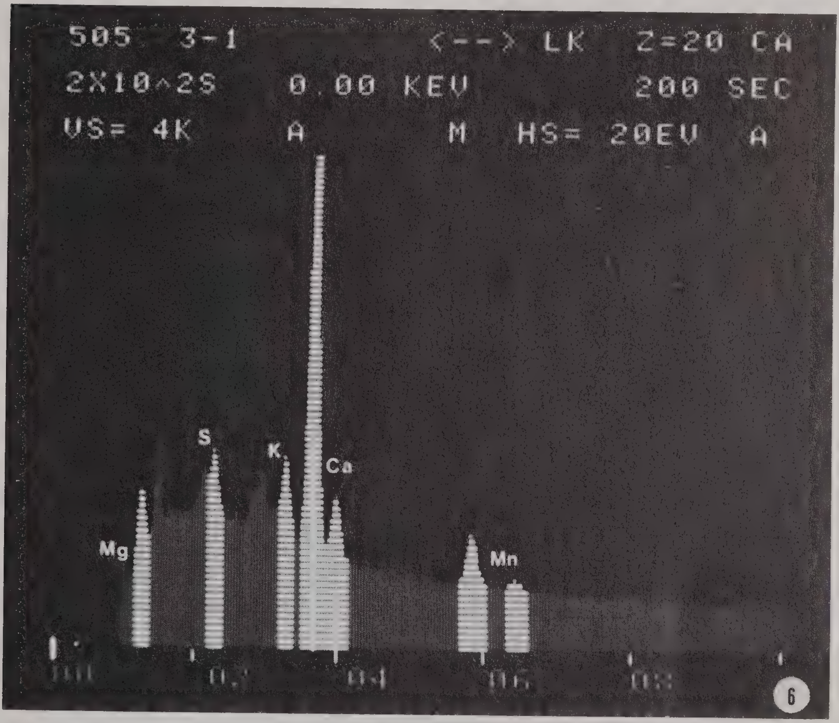


Figure 6. X-ray spectrum of the stalk of M. vesparium (UTMC 505) prior to background subtraction. Vertical scale 4 K.

Manganese, silicon, phosphorus, sulphur, chlorine, potassium, and iron were present sporadically and in low concentrations. In addition to these elements which were also present in the peridium, copper was present in the stalks of six of the collections examined.

Manganese was present in the stalk of most of the specimens examined, although in lower amounts than found in the peridium (Figure 7).

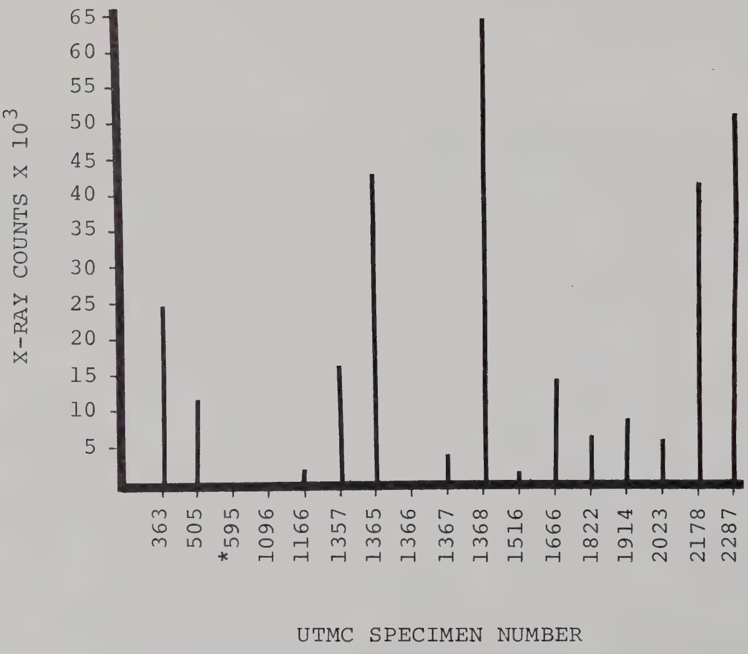


Figure 7. Normalized x-ray counts of manganese from the stalk of M. *vesparium*. *Stalk was not available for UTMC 595.

Calcium was found in the stalk of all specimens examined, usually in concentrations lower than that found in peridium (Figure 8).

The stalk exhibited a range of 14,823 to 125,216 calcium counts/200 sec. probe, with a mean of 75,367 counts and a standard deviation of 28,507 counts.

A secondary electron image of a fructification of M. *vesparium* is illustrated in Figure 9 and a concentration map of calcium in the same fructification in Figure 10. Calcium is located throughout the sporangium, with higher concentrations indicated in the peridium.

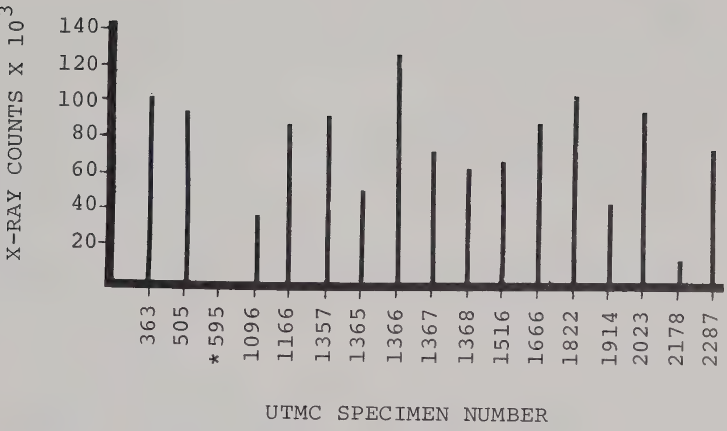
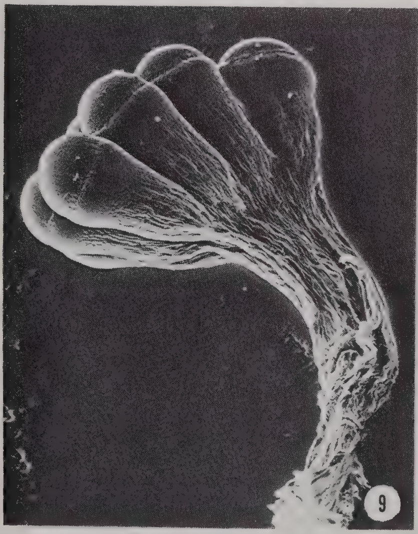
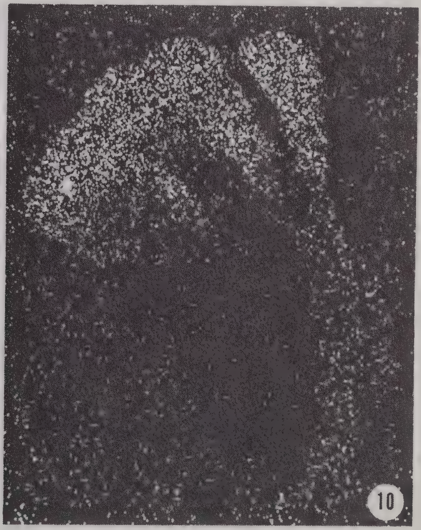


Figure 8. Normalized x-ray counts of calcium from the stalk of M. vesparium. *Stalk was not available for UTMC 595.





Figures 9-10. Figure 9. Secondary electron image of a M. vesparium fructification, X 25.
Figure 10. Concentration map showing the location of calcium within the same fructification.

DISCUSSION

High levels of calcium were consistently present in all seventeen collections of *M. vesparium* examined, representing widely scattered geographical locations. A one-way analysis of variance indicated a significant difference in the calcium content of the areas analyzed at the 0.05 level. Since there were unequal numbers of samples per area examined (some sporangia lacked stalks), Kramer's (1956) modification of Duncan's new multiple range test (Steel and Torrie, 1960) was performed. This test indicated a significant difference in calcium concentration at the 0.05 level between the operculum and the stalk, and also between the sporangial base and the stalk. No significant difference in calcium concentration was demonstrated between the operculum and the sporangial base.

The exact chemical form in which the calcium is present in *M. vesparium* is unknown. In the order Physarales, visible deposits of calcium are present in the form of calcium carbonate (Pobequin, 1954). It is not possible to identify the carbonate ion by energy dispersive x-ray spectrometry. It is unlikely that calcium is present in this chemical combination in *M. vesparium* since effervescence is not noted when sporangia are mounted in acid media. Neither phosphorus nor sulphur were detected consistently in all specimens. It is therefore unlikely that calcium is present as a phosphate or sulphate. It is possible that the calcium is not present as an inorganic salt, but rather that it is bound to organic anionic groups.

In view of the high levels of calcium in fructifications of *M. vesparium* it is incorrect to synonymously associate high concentrations of calcium exclusively with the Physarales. The concentration of calcium in *M. vesparium* is as high as that found in some specimens of *Physarum leucopus* Link examined by energy dispersive x-ray spectrometry. Preliminary readings on a limited number of other Trichiales, *Oligonema flavidum* (Peck) Peck and *Hemitrichia calyculata* (Speg.) Farr, indicate the presence of calcium at levels much lower than that found in *M. vesparium*.

The taxonomic significance of the high levels of calcium in *M. vesparium* is difficult to assess at the present time and will require similar data on numerous collections of Trichiales. Also, regardless of how much calcium is found in the so-called noncalcareous Myxomycetes, we do not believe such results should be used in radically disturbing the classification system of these organisms which has proved very workable over the last century. Whereas anyone who is interested in identifying Myxomycetes possesses a light microscope, the technique of energy dispersive x-ray spectrometry is not likely to become commonly available soon, except to persons associated with relatively large laboratories. On the other hand, the presence of calcium and other elements in significant quantities in some groups, will undoubtedly influence our phylogenetic ideas, and it is with this thought in mind that we expect to continue and expand our research efforts.

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MYCOTAXON

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CLASSIFICATION OF OPHIOCERAS DOLICHOSTOMUM[1]

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SUMMARY

The structure of the perithecial peridium (textura angularis) and beak (textura intricata) and the hypersaprobic habit of Ophioceras dolichostomum indicate that the genus Ophioceras is best accommodated in the family Lasiosphaeriaceae of the Sordariales. Detached asci move up the ostiole and accumulate at the tip of the beak. Sometimes the entire ascus is discharged forcibly.

INTRODUCTION

A pyrenomycete characterized by perithecia with elongated beaks and scolecosporous ascospores collected on partially submerged wood in a stream in Florida was identified as Ophioceras dolichostomum (Berk. & Curt.) Sacc. The Florida collection provided an opportunity to develop a fuller description of this species and to assess the taxonomic position of the genus Ophioceras.

DESCRIPTION OF THE FUNGUS

A search of the literature led to Ophioceras Saccardo (1883) a genus described as a scolecosporous Ceratostoma. An isotype collection of O. dolichostomum from NY was compared with the Florida collections. There seems little doubt that they are the same species. Because of the scarcity of information on O. dolichostomum in the literature, a full description of the fungus based on the isotype and the Florida collections is provided.

Ophioceras dolichostomum (Berk. & Curt.) Sacc. 1883. Syll. Fung. 2:358 (Figs. 1-8).
= Sphaeria dolichostoma Berk. & Curtis, 1869. J. Linn. Soc. London 10:388.

Perithecia immersed in wood, ca. 500 µm diam., with beak 1-5 mm long. Peridium firm, blackened except at the apex of the beak, cell layers compressed in side view, surface composed of a large celled textura angularis; beak composed of a textura intricata with hyphae

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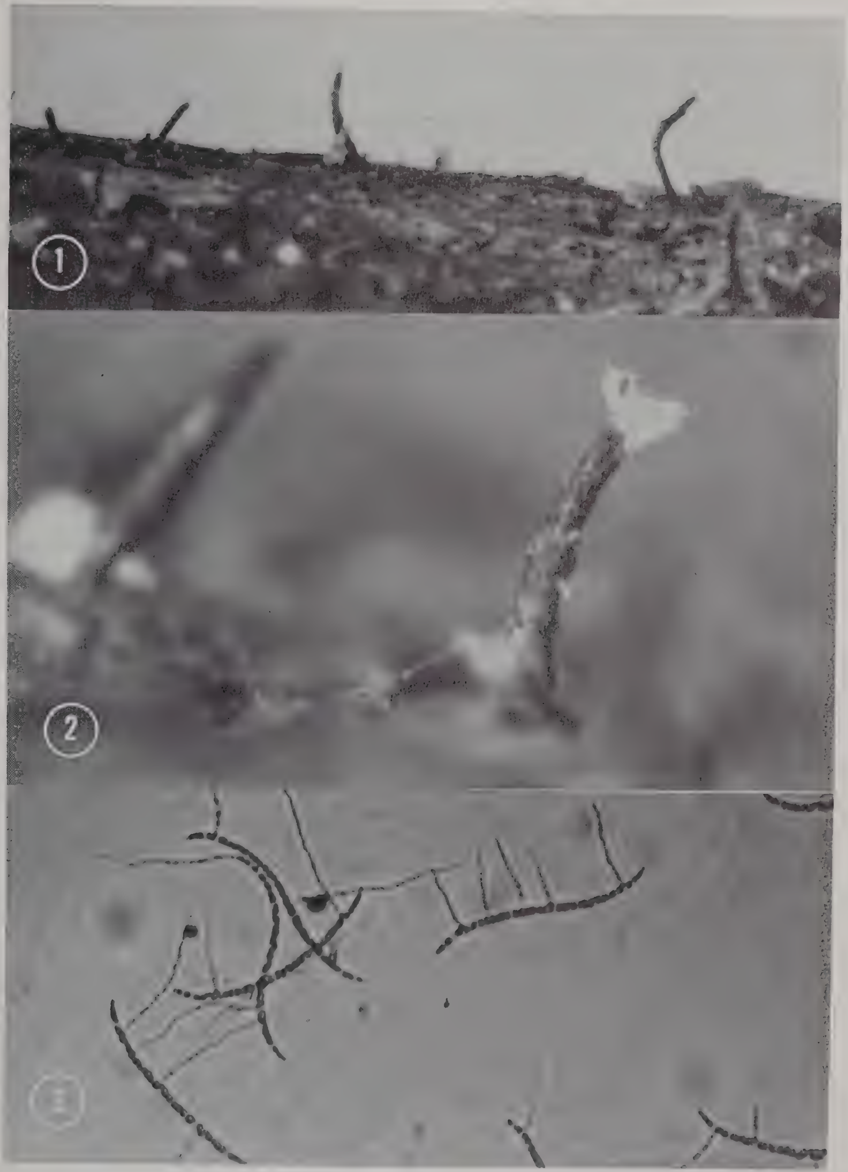
[1] *Florida Agricultural Experiment Station Journal Series No. 378.*



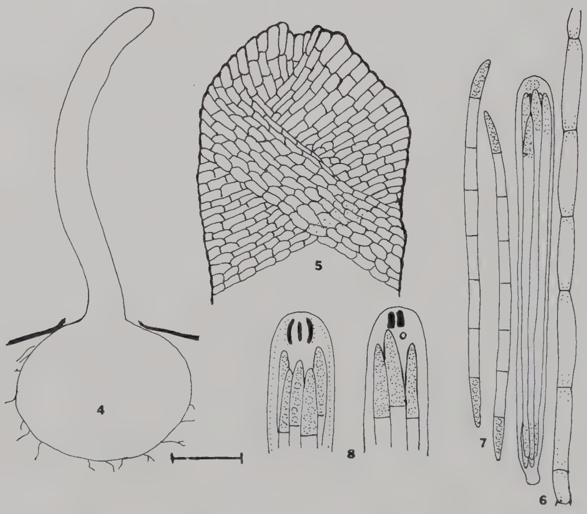
Figs. 1-3. *Ophioceras dolichostomum*. 1. Elongated perithecial beaks erumpent through wood substrate. X20. 2. Close-up of perithecial beak with a mass of asci and ascospores at the tip. X120. 3. Germinating ascospores. X150.

arranged obliquely and crossing one another in the upper regions. Asci 100-130 x 8-12 µm, unitunicate, cylindric, with a chitinoid apical annulus refractive in water, readily detached from subhymenium, in some a small nonchitinoid globule visible below the apical annulus. Paraphyses broad, tapering to tips. Ascospores 94-110 x 2-3 µm, hyaline singly, light yellowish brown in mass, filiform, 3-7 septate, occasionally with additional septa, not constriced at septa, contents of middle cells homogenous, end cells guttulate, wall thin and smooth, in a parallel fascicle in the ascus.

Hypersaprobic on wood substrata, Quercus sp. where definitely known.

Material examined: Sphaeria dolichostoma, No. 856 Fungi Cubenses Wrightiani, coll. C. Wright (isotype, NY); Devil's Millhopper, 5 mi northwest of Gainesville, Florida, K. E. Conway, 15, Sept., 1968 (FL, MASS, NY).

The perithecia develop in the wood and have greatly elongated beaks up to 5 mm (Figs. 1 & 4). The unitunicate asci become detached from the subhymenium and under moist conditions some are discharged as a unit with the ascospores from the ostiole (Figs. 2). Some asci are shot several centimeters from the ascocarp as they explode from the ostiole. Most, however, are trapped at the tip of the beak as shown in Figure 2. The ascospores are hyaline, filiform, and septate. Each cell in the mature ascospore is capable of producing a germ tube (Fig. 3); however, only four to five germ tubes are produced per ascospore. When clumps of spores in an ascus are allowed to germinate there appears to be a tendency for germination to occur from only one end of the spore rather than from the middle cells.



Figs. 4-8. Ophioceras dolichostomum. 4. Outline of Perithecium. 5. Pallid apex of beak, showing hyphal arrangement. 6. Ascus and paraphysis. 7. Ascospores. 8. Ascus apices showing chitinoid apical annulus (left) and subapical globule (right). Scale bar = 200 µm for Fig. 4; 35 µm for Fig. 5; 20 µm for Figs. 6-7; 10 µm for Fig. 8.

Single spore isolates were obtained by attaching perithecia to a lid of a petri plate of water agar and directing a beam of light up through the agar. Germinating ascospores were picked from the surface of the agar by a fine needle and plated onto potato-dextrose agar. Both single and multispored cultures have failed to produce either conidial or sexual states.

DISCUSSION

The disposition of Ophioceras in modern taxonomy poses some problems. No recent studies are helpful. Saccardo (1883) listed seven species of Ophioceras. Ophioceras dolichostomum (Berk. & Curt.) Sacc., the first-named species was designated as lectotype by von Höhnel (1911). The description of O. dolichostomum agrees with the generic diagnosis. The fungus was collected on wood in Cuba, and was described with ascospores 75-100 µm long. Clements and Shear (1931), however, designated as lectotype O. macrocarpum (Sacc.) Sacc., the fourth species in Saccardo's original listing. This latter species was described with a short beak, thus deviating from the generic diagnosis, although some species with short beaks were included in the genus by Saccardo. The illustration provided in Icon. mycol. V: pl. C72 shows an ascus with ascospores, apparently drawn from the literature, and gives no new information. Berlese's (1900) illustration is of a vaguely diaporthoid fungus. Müller (in Müller and Dennis, 1965) described Ophioceras cecropiae and referred the species to the Diaporthaceae. From the description and habit of the fungus in leaves, this specimen probably does belong in the Diaporthaceae, but is not a species of Ophioceras.

The suggestion of diaporthaceous character, reinforced by the long-necked perithecia and readily detached asci, was examined. In Barr's (1976) interpretation of the Diaporthales, Ophioceras would be excluded for several reasons, principally the peridium structure of the perithecium and beak and the hypersaprobic habit. These features instead indicate more similarities with the fungi included in the Sordariales sensu Barr (1976) and Huang (1976). The Sordaria type of centrum development in members of Sordariales was described by Huang (1976) as pseudoparenchymatous. Paraphyses grow upward and inward from pseudoparenchyma cells and create a central cavity. The paraphyses may persist or deliquesce. Asci of the species of Sordariales may be firmly attached or readily separable from the subhymenial-cells and may be forced through the ostiolar canal as a unit. This unique phenomenon in O. dolichostomum of ascal ejection is found in only a few fungi and will be the subject of another report. The perithecial peridium, a textura angularis in face view, is composed of large pseudoparenchymatous cells. The surface layer of the beak, whether short or elongate, is a textura intricata of smaller cells, often arranged in rows and fanning out obliquely (Fig. 5) The perithecial peridium in members of the Diaporthaceae tends to be a textura epidermoidea and the beak a textura porrecta of upright parallel rows of elongated cells. Fungi included in the Diaporthaceae range from parasites to wound parasites to saprobes in recently dead host tissue. Members of the Sordariales are predominately hypersaprobic on old woody or herbaceous substrata or coprophilous, less frequently parasitic or hyperparasitic.

In the Sordariales, the family Lasiosphaeriaceae seems at present the best accommodation for Ophioceras. In this family, the apical annulus of the ascus is variable--nonreacting, chitinoid, or rarely amyloid. An apical globule is common and well developed in Lasiosphaeria, and was observed in a rather depauperate condition in O. dolichostomum (Fig. 8). Of those genera whose ascospores are filiform, Mycomedusiospora Carrol & Munk (1964), with M. flavida (Rick) Carrol & Munk, has ascospores which fragment and separate into spore parts; the perithecial peridium is soft and yellowish. In Acrospermoides Miller & Thompson (1940), with the sole species A. subulata Miller & Thompson, perithecia are subulate, the peridium is narrow but appears to be pseudobombardioid, and the very narrow asci have an only slightly developed apical annulus. The arrangement of cells of the beak peridium of O. dolichostomum is reminiscent of those in some species of Acrospermum, as described by Eriksson (1967). The position of Acrospermum is still debatable.

ACKNOWLEDGEMENTS

The authors wish to express a deep appreciation to Dr. E. S. Luttrell for his helpful comments and review of this manuscript. Appreciation is also extended to Dr. James Kimbrough for his initial guidance in this research.

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MYCOTAXON

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STUDIES IN THE GENUS CORTINARIUS, III: SECTION DERMOCYBE, NEW NORTH AMERICAN SPECIES[1]

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SUMMARY

Five new species of *Cortinarius* are described from western North America. All are in the section *Dermocybe* and are as follows: *C. aurantiobasis*, *C. humboldtensis*, *C. olivaceopictus*, *C. thiersii* and *C. zakii*.

INTRODUCTION

Cortinarius section *Dermocybe* is a diversified and widespread group; consequently a thorough classification of the North American species will require years of further study. In studies preparatory to such a treatment we have been able to clarify the concepts of previously reported species and, in addition, have published some new species and varieties (1-5).

In our investigations of *Dermocybe* we have been particularly interested in the species that occur in western North America. Data collected from many years of study show that the *Dermocybe* flora of this region is especially diverse and that the number of species is large in comparison to the other areas of North America studied to date. In this paper, we have described five new species. Four of these species, *C. aurantiobasis*, *C. humboldtensis*, *C. thiersii* and *C. zakii* have been found only in western North America. The fifth species, *C. olivaceopictus*, occurs in Michigan as well as western North America.

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[1] Portion of a dissertation submitted by the senior author to the Graduate School of The University of Michigan in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

Microscopic studies were made from freehand sections mounted in KOH (a 2.5% aqueous solution) and Melzer's reagent (KI 1.5 gr., iodine 0.5 gr., H_2O 20.0 gr., chloral hydrate 22.0 gr.). Macroscopic color reactions were tested with 2.5% KOH. Specific color designations capitalized and enclosed in parentheses are from R. Ridgway, *Color Standards and Color Nomenclature(6)*. Uncapitalized color terms are regarded as useful approximations. Collections cited in 'Collections examined' are deposited in The University of Michigan Herbarium (MICH) unless otherwise indicated by the appropriate symbols from the *Index Herbariorum*.

CORTINARIUS AURANTIOBASIS Ammirati and Smith, sp. nov.

Fig. 1

Pileus 25-50 mm latus, convexus demum planus vel subplanus, siccus, minute fibrilloso-squamosus quidem marginem versus, plerumque disco glabro et impolito, brunneo-rufus, aetate disco fusciore; contextus pallide luteo-bubalinus; odor et sapor indistincti. Lamellae adnexae, confertae, intense brunneolo-aurantiacae demum ferrugineae. Stipes 30-50 mm longus, 4-6 mm crassus, aequalis vel deorsum incrassatulus, pallide luteo-bubalinus demum pileo concolor, deorsum aurantio-brunneus fibrillosus, apice sericeo-fibrillosus. Sporae 8.5-11(-12) x 5-6 µm, ellipticae, verruculosae. Holotypus: A.H. Smith 24213 (MICH), prope Still Creek, Mt. Hood National Forest, Clackamas Co., Oregon, October 6, 1946.

PILEUS 25-50 mm broad, convex expanding to nearly plane, sometimes subumbonate, with the margin incurved, dry, minutely fibrillose-scaly at least over the margin, disc usually glabrous and unpolished, buttons brownish rufous (Hazel) or somewhat duller, in age brownish rufous over a broad marginal area and darker (near Chestnut Brown) on the disc. Context pale buff-yellow (Cream Color) in young pilei, when moist dull yellow (Honey Yellow); odor and taste indistinctive.

LAMELLAE sharply and deeply adnexed, close, broad, edges slightly uneven, 1-2 tiers of lamellulae, color at first deep brownish orange (Amber Brown) and in age only slightly darker (near Sanford's Brown).

STIPE 30-50 mm long, 4-6 mm thick, equal or slightly enlarged below, pale buff-yellow (Cream Color) to dull buff-yellow(Chamois) at first, gradually darkening to concolorous with the pileus, frequently with orange-brown appressed fibrils over the lower two-thirds, apex silky fibrillose. Context solid, brownish yellow-orange (Raw Sienna) in the cortex.

PILEUS SURFACE of fresh basidiocarps reddish with the application of KOH.

SPORES 8.5-11 (-12) x 5-6 µm, in profile elliptic and obscurely inequilateral to somewhat inequilateral, in face view elliptic to slightly ovate, verruculose, in KOH light brownish, in Melzer's light yellowish to yellowish brown. BASIDIA 4-spored, 24-34 x 7-9 µm, clavate to more or less ventricose, thin-walled, in KOH hyaline to pale vinaceous, some containing droplets or particles of deep red to vinaceous-red pigment, in Melzer's light yellowish, some containing droplets or particles of yellow, orange or reddish orange pigment. PLEUROCYSTIDIA absent. CHEILOCYSTIDIA not well differentiated, 12-23 x 6-11 µm, clavate to broadly clavate or more or less ventricose, thin-walled, in KOH and Melzer's similar to basidia. SUBHYMENIAL HYPHAE compactly interwoven, cylindrical, 2.5-5 (-5.5) µm wide, thin-walled, in KOH and Melzer's as for the hyphae of the lamellar trama. TRAMAL HYPHAE OF LAMELLAE subparallel to slightly interwoven, cylindrical to more or less inflated, 5-20 µm wide, thin-walled, in KOH hyaline, pale vinaceous or pinkish, some containing particles of vinaceous to yellowish pigment, in Melzer's yellowish. CUTICULAR HYPHAE OF PILEUS interwoven, more or less radially arranged, cylindrical to slightly inflated, 4.5-18 (-25) µm wide, thin-walled, in KOH hyaline to faintly colored, pale brownish to pale vinaceous or containing a more or less concentrated red-brown to vinaceous-brown pigment, in Melzer's yellowish, yellowish brown or yellowish orange-brown; pileocystidia absent. TRAMAL HYPHAE OF PILEUS interwoven, more or less radially arranged, cylindrical to inflated, 6-25 µm wide, thin-walled, in KOH hyaline to pale vinaceous or pinkish, in Melzer's yellowish. CORTICAL HYPHAE OF STIPE longitudinally arranged, subparallel to slightly interwoven, cylindrical to inflated 5-20 µm wide, thin-walled, in KOH and Melzer's as for the hyphae of the pileus trama; caulocystidia apparently absent. CORTINAL HYPHAE cylindrical, 5-9 µm wide, thin-walled, in KOH and Melzer's as for the hyphae of the stipe cortex. CLAMP CONNECTIONS of the normal type, present throughout the basidiocarp. OLEIFEROUS HYPHAE present, in KOH dingy yellowish, in Melzer's apparently not evident. INTERHYPHAL PIGMENT DEPOSITS present in the pilear trama, lamellar trama and the stipe cortex, in KOH dark red to vinaceous-red (refractive, yellow particles often present in mounts) in Melzer's yellow, yellow-orange or orange, some particles becoming blackish (amylaceous).

Gregarious in rich humus under conifers or on decayed conifer logs. Fruiting period: September to November.

Collections examined: IDAHO: Bonner Co: J.F. Ammirati 257a (SFSU): A.H. Smith 71705. OREGON: Clackamus Co. A.H. Smith 24213 (holotype, MICH), 24952, 26715; Tillamook Co.: A.H. Smith 80127. WASHINGTON: Lewis Co.: A.H. Smith 48490; Pierce Co.: A.H. Smith 40696, 40698, 40700, 48286, 48292, 48297, 48298, 48427, 48499, 48582, 48606, 48614, 48653, 48709, 48857, 48869, 49404.

The major distinctive features of *C. aurantiobasis* are its large spores, the pale buff-yellow stipe that darkens in age, the orange-brown fibrils over the lower stipe surface and the brownish rufous to reddish brown colors of the pileus surface. The orange coloration of the young lamellae appears to relate it to other Dermocybes with similarly colored young lamellae. Usually the lamellae of *C. aurantiobasis* are brownish orange to brownish orange-yellow when young but may be light orange (in Smith 24952 and 48606) and then darken to brownish orange as they mature.

In general appearance *C. aurantiobasis* is most similar to *C. zakii* and *C. subcroceofolius* Ammirati and Smith, especially when mature basidiocarps are compared. However, the large spores of *C. aurantiobasis* easily distinguish it from these species as well as other

Dermocybes with orange-colored young lamellae.

C. aurantiobasis often fruits on decayed conifer wood. It is not, however, truly a wood inhabiting species, nor is it unique in this respect. Other Dermocybes, for example *C. zakii* and *C. semisanguineus* (Fries) Gillet, also sometimes fruits on decayed conifer wood.

CORTINARIUS HUMBOLDTENSIS Ammirati and Smith, sp. nov.

Fig. 3

Pileus 30-50 mm latus, obtuse conicus demum plano-umbonatus, appresso-fibrillosus, juventute nitore olivaceo-luteo, margine pallide luteolo-bubalinus, disco pallide cinnamomeo-brunneus; contextus sordide brunneus; odor et sapor nulli; superficies pilei atroviolacea in solution kalii hydroxidi. Lamellae adnatae, confertae, olivaceo-luteae demum plus minusve ochraceae. Stipes 60-120 mm longus, apice 4-8 mm crassus, aequalis vel basi incrassatulus, sordide luteus. Sporae 7-9.2(-10) x 4.5-5.5(-6) µm, ellipticae, verruculosae. Holotypus: A.H. Smith 56392 (MICH), prope Trinidad, Humboldt Co., California, December 6, 1956.

PILEUS 30-50 mm broad, obtusely conic becoming plano-umbonate, with the margin incurved and becoming decurved, appressed fibrillose, with an olive-yellow (Honey Yellow) sheen when young, margin light yellow-buff (Ochraceous Buff), disc pale brown (pale Cinnamon Brown). Context dingy brown (near Snuff Brown); odor and taste none.

LAMELLAE adnate, close, broad, at first olive-yellow (Honey Yellow), finally more or less ocher yellow.

STIPE 60-120 mm long, 4-8 mm thick at the apex, equal or base slightly enlarged, fibrillose, dingy yellow to the base, with a covering of brownish fibrils, base pale yellowish. Context dingy brownish in cortex, darker in the base.

PILEUS SURFACE of fresh basidiocarps quickly dark inky violet then slowly purple-brown with the application of KOH.

SPORES 7-9.2(-10) x 4.5-5.5(-6) µm, in profile elliptic and obscurely inequilateral to somewhat inequilateral, in face view elliptic to ovate, verruculose, in KOH light brown to light fulvous, in Melzer's yellowish to yellowish brown. BASIDIA 4-spored, 21-30 x 7.5-9.5 µm, clavate to broadly clavate or occasionally more or less ventricose, thin-walled, in KOH hyaline to pale vinaceous, sometimes containing droplets and colorless granules or particles of red to vinaceous-red pigment, in Melzer's pale yellow to dingy yellow, sometimes containing particles of yellow pigment. PLEUROCYSTIDIA absent. CHEILOCYSTIDIA apparently absent. SUBHYMENIAL HYPHAE compactly interwoven, cylindrical, 2-6 µm wide, thin-walled, in KOH and Melzer's as for the hyphae of the lamellar trama. TRAMAL HYPHAE OF LAMELLAE subparallel to slightly interwoven, cylindrical to more or less inflated, 6-25 µm wide, thin-walled, in KOH hyaline or containing a pale reddish pigment, sometimes containing droplets and colorless particles, in Melzer's pale yellow to dull yellow. CUTICULAR HYPHAE OF PILEUS interwoven, more or less radially arranged, cylindrical to more or less inflated, 5-20 µm wide, thin-walled, in KOH hyaline, pale brown or pale purplish, some containing particles of deep purple to bluish purple pigment, in Melzer's dull yellowish; pileocystidia absent. TRAMAL HYPHAE OF PILEUS interwoven, more or less radially arranged, cylindrical to inflated, 6-25 µm wide, thin-walled, in KOH and Melzer's as for the hyphae of the lamellae trama. CORTICAL HYPHAE OF STIPE longitudinally arranged, subparallel to more or less interwoven, cylindrical to more or less inflated, 6-25 µm wide, thin-walled, in KOH hyaline, pale vinaceous to pinkish red or containing a concentrated red pigment, in Melzer's yellowish and sometimes containing colorless droplets; caulocystidia apparently absent. CORTINAL HYPHAE cylindrical, 2-8 µm wide, thin-walled, in KOH hyaline to pinkish or containing a concentrated vinaceous pigment, in Melzer's pale yellow or containing a more or less concentrated orangish pigment. CLAMP CONNECTIONS of the normal type, present throughout the basidiocarp. OLEIFEROUS HYPHAE present, in KOH grayish to brownish or slightly vinaceous, in Melzer's yellowish. INTERHYPHAL PIGMENT DEPOSITS present in the pilear trama, lamellar trama and the stipe cortex, in KOH yellow, orange, red or vinaceous red, in Melzer's yellow, orange or slightly reddish (sometimes shaded brownish).

Gregarious under *Pinus*. Fruiting period: December.

Collections examined: CALIFORNIA: Humboldt Co.: A.H. Smith 56392 (holotype, MICH), 56592.

C. humboldtensis is easily separated from other yellow-olive species of *Dermocybe* by the inky-violet KOH reaction of the pileus surface of fresh basidiocarps. All similarly colored species studied to date give a reddish, dark brown or dark olive reaction when KOH is applied to the pileus surface of fresh basidiocarps. The color reaction in *C. humboldtensis* is due to the purplish or bluish purple pigment and particles present in the hyphae of the pileus cuticle. A similar reaction is present in the hyphae of the pileus cuticle of *C. semisanguineus* but this species typically has deep red lamellae and a more strongly yellow-brown pileus and stipe.

CORTINARIUS OLIVACEOPICTUS Ammirati and Smith, sp. nov.

Fig. 5

Pileus 20-40 mm latus, ex obtuso plano-umbonatus, minute fibrillosus, subhygrophanus, disco rufobrunneus, margine olivaceo-brunneus; contextus ex olivaceo pallescens; odor indistinctus, sapor mitis vel subamarus. Lamellae adnexae, confertae, obscure luteolo-olivaceae demum ferrugineo-olivaceae. Stipes 40-70 mm longus, 8-13 mm crassus, aequalis, olivaceus, basi olivaceo-bubalinus, apicum versus fibrillis brunneo-aurantiacis zonatus. Sporae 6.5-8(-8.5) x 3.5-4.6(-5-6) µm, ellipticae, verruculosae. Holotypus: A.H. Smith 79016 (MICH), prope Van Duzer Corridor, Tillamook Co., Oregon, October 13, 1970.

PILEUS 20-40 mm broad, obtuse expanding to plano-umbonate, minutely fibrillose, subhygrophanous, disc reddish brown (Tawny) to more reddish, margin olive-brown (Tawny-Olive), fading to olive-brown (Tawny-Olive) overall at times. Context dark olive when moist, paler faded; odor slight, taste mild or slightly bitter.

LAMELLAE adnexed, close, broad, color at first dark yellowish olive, more rusty in age but olive tones remaining evident.

STIPE 40-70 mm long, 8-13 mm thick, equal, apex silky, color olive overall to base, olive-buff on the base, with belts or patches of deep brownish orange (Burnt Orange) fibrils near the apex. Context olive above, olive-fuscous in base.

PILEUS surface of fresh basidiocarps reddish with the application of KOH.

SPORES 6.5-8(-8.5) x 3.5-4.6(-5-6) µm, in profile elliptic and obscurely inequilateral to somewhat inequilateral, in face view elliptic to ovate, verruculose, in KOH light brown, in Melzer's brownish to brownish yellow. BASIDIA 4-spored, 26-34 x 6.2-8 μm, clavate to narrowly clavate, thin-walled, in KOH hyaline, pale yellowish or pale brownish, often containing colorless to yellowish particles or droplets, in Melzer's yellowish to yellowish brown, some containing particles of yellowish pigment or large droplets. PLEUROCYSTIDIA absent. CHEILOCYSTIDIA apparently absent. SUBHYMENIAL HYPHAE compactly interwoven, cylindrical, 2.5-5.5 μm wide, thin-walled, in KOH and Melzer's as for the hyphae of the lamellar trama. TRAMAL HYPHAE OF LAMELLAE subparallel to slightly interwoven, cylindrical to more or less inflated, 5-25 μm wide, thin-walled, in KOH hyaline to pale brownish, in Melzer's yellowish to yellowish brown, some containing particles of yellowish pigment. CUTICULAR HYPHAE OF PILEUS interwoven, more or less radially arranged, cylindrical to inflated, 6-26 μm wide, thin-walled, in KOH nearly hyaline to pale brownish or containing a more or less concentrated brownish orange, dull orange or reddish pigment or similarly colored particles, in Melzer's yellowish, yellowish brown or yellowish orange-brown; pileocystidia absent. TRAMAL HYPHAE OF PILEUS interwoven, more or less radially arranged, cylindrical to inflated, 6-30 μm wide, thin-walled, in KOH and Melzer's as for the hyphae of the lamellar trama. CORTICAL HYPHAE OF STIPE longitudinally arranged, subparallel to more or less interwoven, cylindrical to more or less inflated, 5-20 μm wide, thin-walled, in KOH hyaline, pale brownish or faintly vinaceous, in Melzer's yellowish; caulocystidia apparently absent. CORTINAL HYPHAE cylindrical, 3.5-8 μm wide, thin-walled, in KOH and Melzer's as for the hyphae of the stipe cortex. CLAMP CONNECTIONS of the normal type or, on some of the basal mycelium, of the medallion type, present throughout the basidiocarp. OLEIFEROUS HYPHAE present, in KOH pallid grayish to pale yellowish, in Melzer's yellowish to yellowish orange. INTERHYPHAL PIGMENT DEPOSITS present as small deposits in the pilear trama, lamellar trama and stipe cortex, in KOH yellow, in Melzer's dull yellowish to yellowish brown.

Gregarious to scattered in conifer or mixed woods. Fruiting period: September to October (western North America) or July (eastern North America).

Collections examined: MICHIGAN: Emmet Co.: A.H. Smith 32818. OREGON: Benton Co.: J.F. Ammirati 5981; Clackamas Co.: A.H. Smith 20158, 24609, 24610; Tillamook

Co.: A.H. Smith 79016 (holotype, MICH), 79203, 79278. WASHINGTON: Pierce Co. A.H. Smith 47561.

C. olivaceopictus is one of several Dermocybes with strong yellowish olive to olive colors. In general appearance it is similar to *C. humboldtensis* but it can be separated from the latter by its smaller spores, the ferruginous to reddish orange fibrils or fibrillose zones on the stipe and the reddish, rather than dark inky violet, reaction of the pileus surface of fresh basidiocarps with KOH. *C. tubarius* Ammirati and Smith and *C. huronensis* var. *olivaceus* Ammirati and Smith are easily separated from *C. olivaceopictus* by their larger spores.

CORTINARIUS THIERSII Ammirati and Smith, sp. nov.

Fig. 2

Pileus 15-50 mm latus, obtuse convexus demum plano-convexus, umbonatus vel subdepressus, glaber vel sericeus vel appresso-fibrillosus, primo lamellis immaturis concolor demum ochraceo-brunneus vel cinnamomeo-brunneus; contextus solidus, usque 2 mm crassus, superficie pilei concolor vel pallidior; odor et sapor raphanini. Lamellae confertae vel subdissitae, luteolo-bubalinae dein pallide ochraceo-luteae vel pallide ochraceo-bubalinae demum fulvo-tinctae. Stipes 30-50 mm longus, 4-10 mm crassus, aequalis vel basi incrassatulus, siccus, appresso-fibrillosus, pallide viridi-luteus demum pallide luteo-bubalinus vel subochraceo-bubalinus, interdum plus brunneus vel brunneo-olivaceus. Cortina luteola, evanescens. Sporae 7.7-10(-12) x 4.7-5.8 (-6.2) µm, ellipticae, verruculosae. Holotypus: H.D. Thiers 12633 (SFSU), prope Pinecrest Campground, Tuolumne Co., California, June 14, 1965.

PILEUS 15-50 mm broad, obtusely convex when young, becoming plano-convex, umbonate to shallowly depressed, in age often irregular in outline, margin incurved becoming decurved, smooth to silky or appressed fibrillose, never scaly but often lacerated or torn in age, when young more or less concolorous with the young lamellae or yellow brown (Buckthorn Brown) to olive-brown (Dresden Brown), in age becoming ochraceous brown (Ochraceous-Tawny) to deep brown (Cinnamon Brown), in some slightly darker on the disc or the margin more pallid. Context solid, up to 2 mm thick, more or less concolorous with the surface or slightly paler;

odor and taste raphanoid.

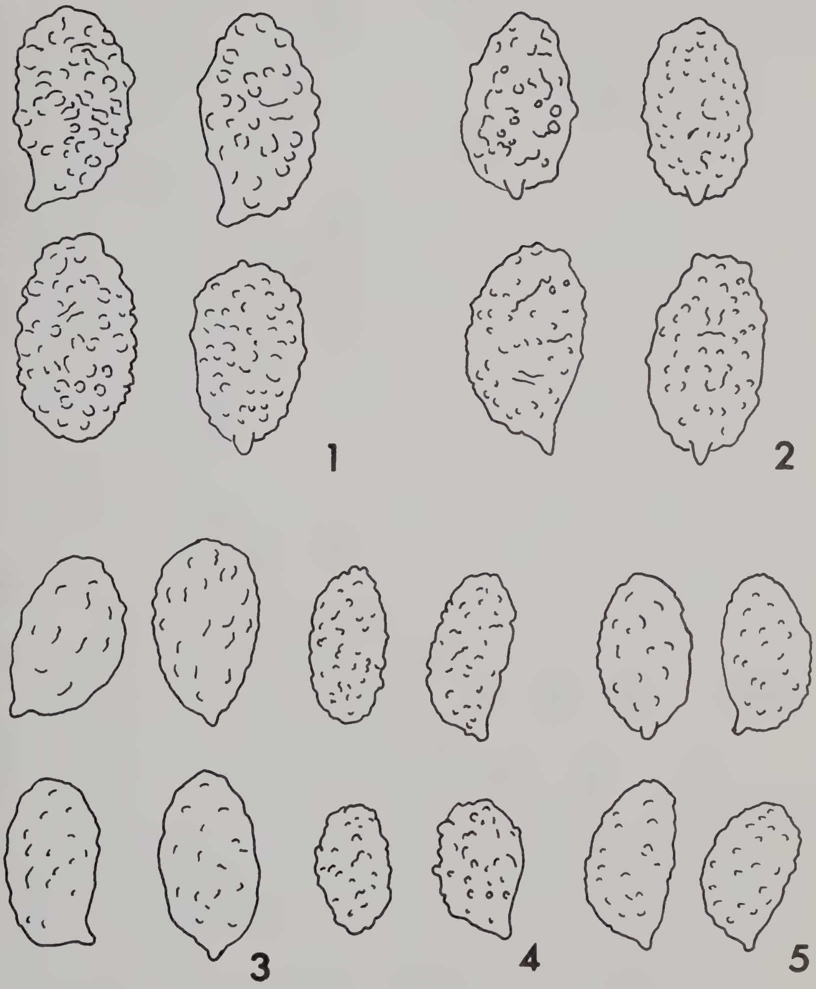
LAMELLAE shallowly to deeply notched, close to subdistant, thin, some slightly ventricose, edges even to eroded, several tiers of lamellulae, when very young light yellowish buff (Warm Buff) becoming light ochraceous yellow to light ochraceous buff (Yellow Ocher, Antimony Yellow, Ochraceous Buff) finally with a fulvous (Ochraceous-Tawny) cast, edges concolorous with the faces.

STIPE 30-50 mm long, 4-10 mm thick, equal or the base slightly enlarged, dry, appressed fibrillose becoming more or less fibrillose scaly from handling, color light greenish yellow (Chalcedony Yellow) when young, becoming light yellowish buff (Warm Buff) to light ochraceous buff (Ochraceous Buff) or some in age sordid or more brownish to brownish olive (Ochraceous-Tawny to Dresden Brown). Context stuffed becoming hollow, more or less concolorous with the surface.

CORTINA yellowish, not leaving a noticeable annulus on the stipe.

PILEUS SURFACE of fresh basidiocarps not tested with KOH; pileus surface of dried basidiocarps vinaceous-red with the application of KOH.

SPORES 7.7-10(-12) x 4.7-5.8(6.2) µm, in profile elliptic and obscurely inequilateral to somewhat inequilateral, in face view elliptic to broadly elliptic or slightly ovate, verruculose, in KOH light brownish to light fulvous (Ochraceous-Tawny), in Melzer's yellowish to yellowish brown. BASIDIA 4-spored, 29-34 x 7.5-9.5 µm, broadly clavate to clavate or more or less ventricose, thin-walled, in KOH hyaline to pale vinaceous, some containing colorless to yellowish granules and droplets or particles and masses of purplish red, red, reddish orange, orange or yellowish pigment, in Melzer's pale yellow or containing particles of reddish, orange or yellowish pigment. PLEUROCYSTIDIA absent. CHEILOCYSTIDIA not well differentiated, 14-18 x 6-9.5 µm, clavate to broadly clavate, thin-walled, in KOH and Melzer's as for the basidia but fewer containing particles of pigment. SUBHYMENIAL HYPHAE compactly interwoven, cylindrical, 2.5-6(-6.5) µm wide, thin-walled, in KOH and Melzer's as for the hyphae of the lamellar trama. TRAMAL HYPHAE OF LAMELLAE subparallel to slightly interwoven, cylindrical to more or less inflated, 5-26 µm wide, thin-walled, in KOH hyaline to pale vinaceous or containing a more or less concentrated vinaceous to yellowish pigment, in Melzer's yellowish. CUTICULAR HYPHAE OF PILEUS interwoven, more or less radially arranged,



FIGS. 1-5 Basidiospores (x1800). 1. *Cortinarius aurantiobasis*. 2. *Cortinarius thiersii*. 3. *Cortinarius humboldtensis*. 4. *Cortinarius zakii*. 5. *Cortinarius olivaceopictus*.

cylindrical to more or less inflated, 5-25 µm wide, thin-walled, in KOH hyaline, pale vinaceous to pale brown or containing a more or less concentrated reddish, vinaceous or brownish vinaceous pigment, some slightly encrusted, in Melzer's yellowish, yellowish brown or yellowish orange-brown; pileocystidia absent. TRAMAL HYPHAE OF PILEUS interwoven, more or less radially arranged, cylindrical to inflated, 6-30(-40) µm wide, thin-walled, in KOH and Melzer's as for the hyphae of the lamellar trama. CORTICAL HYPHAE OF STIPE longitudinally arranged, subparallel to more or less interwoven, cylindrical to more or less inflated, 6-25 µm wide, thin-walled, in KOH hyaline, pale pinkish to pale reddish or containing a more or less concentrated reddish vinaceous to vinaceous pigment or red-vinaceous particles, in Melzer's yellowish or yellowish orange to dull orange, some containing granules; caulocystidia apparently absent. CORTINAL HYPHAE cylindrical, 3.5-7 µm wide, thin-walled, in KOH as for the hyphae of the stipe cortex, in Melzer's yellowish. CLAMP CONNECTIONS of the normal type, present throughout the basidiocarp. OLEIFEROUS HYPHAE present, in KOH vinaceous to brownish vinaceous, in Melzer's yellowish to yellowish brown. INTERHYPHAL PIGMENT DEPOSITS present in the pilear cuticle and trama, the lamellar trama and the stipe cortex, in KOH purplish red, red, orange or ochraceous-orange to yellow, in Melzer's reddish orange to yellowish.

Caespitose to gregarious under conifers. Fruiting period: June to August.

Collections examined: CALIFORNIA: Amador Co: J.F. Ammirati 182 (SFSU); G. Breckon 413 (SFSU), 422 (SFSU); H.D. Thiers 12633 (holotype, SFSU). IDAHO: Custer Co.: A.H. Smith 65655.

C. thiersii is a common species in the higher mountains of California and should be expected in the higher coniferous forests throughout western North America.

The large spores together with the general coloration of the basidiocarps distinguishes it from other species of *Dermocybe* with yellowish lamellae. The pilei are yellowish buff at first and then become brownish to brownish olive and finally more or less cinnamon brown. The lamellae are yellowish buff at first and become ochraceous to brownish or rusty brown in age. The stipe surface is greenish yellow at first and becomes somewhat sordid to brownish below in age or from handling. In some collections the pileus context is somewhat greenish yellow, usually it is similar in color to the pileus surface.

The large spores of *C. thiersii* (spores 7.7-10(-12) x 4.7-5.8(-6.2) µm) indicate some affinity with other large-spored Dermocybes, such as *C. huronensis* and *C. chrysolitus* Kauffman (spores 8.5-11(-12) x 5-6.2 µm), that occur in the coniferous forests of eastern North America. However, more information on the distribution and ecology of these species is needed before their relationship with *C. thiersii* can be determined.

C. thiersii is named for Professor H.D. Thiers, San Franscisco State University, who first collected it from California.

CORTINARIUS ZAKII Ammirati and Smith, sp. nov.

Fig. 4

Pileus 15-45 mm latus, e convexo late obtusus, umbonatus vel subumbonatus, siccus, appresso-fibrillosus, ad marginem primo olivaceo-brunneus deinde subfulvus demum rufobrunneus vel valde rufobrunneus, disco concolor vel fuscior; contextus dilute brunneus; odor et sapor plus minusve raphanini. Lamellae confertae, primo sordide aurantiacae, brunneo-suffusae, deinde pallide brunneo-aurantiacae demum ferrugineo-aurantiacae, aetate interdum maculis rufobrunneis. Stipes 40-75 mm longus, apice 4-10 mm crassus, aequalis vel basi incrassatulus, appresso-fibrillosus, apice luteolus vel luteus, deorsum ochraceus, brunneo-ochraceus vel pallide aurantio-ochraceus et fibrillis brunneis vel vinaceo-brunneis tectus. Sporae (6-)6.5-8 x 4-4.5(-5) µm, ellipticae, verruculosae. Holotypus: J.F. Ammirati, Jr. 6175 (MICH), prope Mary's Peak, Benton Co., Oregon, November 16, 1971.

PILEUS 15-45 mm broad, convex becoming broadly obtuse, umbonate to subumbonate, with the margin incurved to slightly decurved, dry, appressed fibrillose becoming minutely fibrillose-scaly on the margin in age, margin at first olive-brown (Tawny-Olive) or browner, sometimes with slight ochraceous to olivaceous (Old Gold) tones, becoming light fulvous (Ochraceous-Tawny) to reddish brown (Tawny) or deep red-brown (Warm Sepia), sometimes with a streaked appearance, disc more or less concolorous with the margin or slightly darker reddish brown when mature, sometimes the surface with a light olive-yellow (Honey Yellow) sheen overall. Context watery brown, faintly olive or more or less concolorous with surface when moist, when faded pale yellow to light buff or with an orange-buff cast; odor and taste more or less raphanoid.

LAMELLAE close to crowded, adnexed to emarginate, broad, not strongly ventricose, edges uneven, at first dull orange (near deep Zinc Orange) with slight brownish tones, becoming rusty orange (Orange Rufous) to brownish rusty-orange, when older sometimes with reddish brown spots.

STIPE 40-75 mm long, apex 4-10 mm thick, equal or the base slightly enlarged, appressed fibrillose, apex light yellow (Amber Yellow) or slightly deeper yellow (Pinard Yellow) but not strongly orange-yellow, below ochraceous, dingy to brownish ochraceous or slightly dull orange-ochraceous beneath a more or less continuous covering of dull brown to vinaceous brown (Natal Brown) fibrils, base dingy ochraceous to brownish. Context stuffed to hollow, cortex in apex at first yellow but soon sordid and developing watery brown to watery orange-brown tones, lower cortex watery brown to brownish orange and in the base olive-brown to watery olive, pith yellowish to pale dull buff or more sordid or shaded with colors of the cortex, in cavity vinaceous-brown (Natal Brown) in places.

PILEUS SURFACE of fresh basidiocarps reddish with the application of KOH.

SPORES (6-)6.5-8(-9) x 4-4.5(-5) µm, in profile elliptic and obscurely inequilateral to somewhat inequilateral, in face view ovate to elliptic, verruculose, in KOH pale to light brown, in Melzer's pale brown to light yellow-brown. BASIDIA 4-spored, 22-30 x 5.5-7 µm, clavate to narrowly clavate, thin-walled, in KOH hyaline to pale greenish yellow, sometimes containing droplets or more or less filled with concentrated greenish yellow pigment or greenish yellow particles, in Melzer's pale yellow or more or less filled with concentrated yellowish pigment or yellowish particles. PLEUROCYSTIDIA absent. CHEILOCYSTIDIA apparently absent. SUBHYMENIAL HYPHAE compactly interwoven, cylindrical, 2-6 µm wide, thin walled, in KOH and Melzer's as for the hyphae of the lamellar trama. TRAMAL HYPHAE OF LAMELLAE subparallel to slightly interwoven, cylindrical to inflated, 7-28 µm wide, thin-walled, in KOH hyaline to pale greenish yellow or more or less filled with concentrated yellow-green pigment or yellow particles, in Melzer's pale yellow or more or less filled with concentrated yellow-brown pigment or yellow, yellow-brown, dull orange-brown or reddish orange-brown particles. CUTICULAR HYPHAE OF PILEUS interwoven, more or less radially arranged, cylindrical to somewhat inflated, 7-20 µm wide, thin-walled (up to 1.5 µm thick), in KOH hyaline to brownish ochraceous or filled with a concentrated red-vinaceous, brownish vinaceous or brownish pigment, sometimes encrusted, in Melzer's pale yellow, brownish yellow or more ochraceous; pileocystidia absent. TRAMAL HYPHAE OF PILEUS interwoven, more or less radially arranged, cylindrical to inflated, 7-30 µm wide, thin-walled, in KOH hyaline to pale yellow or more ochraceous in the upper trama, in Melzer's pale dull yellow to light ochraceous. CORTICAL HYPHAE OF STIPE longitudinally arranged, subparallel to more or less interwoven, cylindrical to slightly inflated, 7-20 µm wide, thin-walled, in KOH hyaline to pale dull greenish yellow or filled with concentrated greenish yellow pigment or containing yellowish particles, in Melzer's pale yellow, sometimes containing yellowish particles (some of these may be amylaceous); caulocystidia apparently absent. CORTINAL HYPHAE cylindrical, 3-8 µm wide, thin-walled, in KOH hyaline to pale greenish yellow, in Melzer's pale yellowish. CLAMP CONNECTIONS of the normal type, present throughout the basidiocarp. OLEIFEROUS HYPHAE present, in KOH slightly colored to yellowish, in Melzer's yellow to olive-yellow. INTERHYPHAL PIGMENT DEPOSITS present in the pilear trama, lamellar trama and the stipe cortex, in KOH yellow to greenish yellow or dull yellow on standing, in Melzer's yellow, orange or reddish orange (some amylaceous).

Gregarious to caespitose in humus or rotten wood in stands of *Pseudotsuga menziesii* (Mirb.)Franco. Fruiting period: November.

Collections examined: OREGON: Benton Co.: J.F. Ammirati 5984, 6170, 6171, 6172, 6173, 6174, 6175 (holotype, MICH); Polk Co.: A.H. Smith 79721.

The small spores and orange-colored lamellae of *C. zakii* indicate some affinity with *C. malicorius* Fries and *C. croceofolius* Peck. However, *C. zakii* has somewhat larger spores than these species and the color of the young lamellae is usually deep orange rather than yellow-orange or light orange. In addition, the stipe of *C. zakii* is coated with dull brown to vinaceous-brown fibrils while in *C. malicorius* and *C. croceofolius* the fibrils on the stipe are yellow-orange to orange or reddish orange. Also, the flesh of the pileus and stipe of *C. zakii* is usually more brownish to orange tinted than in these species.

C. zakii is named for Dr. B. Zak of the Pacific Northwest Forest and Range Experiment Station, Corvallis, Oregon, who has worked on the mycorrhizae formed by this species (7-8). His studies show that *C. zakii* forms ectendomycorrhizae with *Arbutus menziesii* Pursh and ectomycorrhizae with *Pseudotsuga menziesii* and *Abies grandis* (Dougl.) Lindl.

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NOMENCLATURAL CHANGES AND NEW SPECIES IN THE UREDINALES[1]

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SUMMARY

New species are: *Coleosporium arizonicum* on *Brickellia* in Arizona; *C. durangense* on *Eupatorium*, *C. incompletum* on *Stevia*, *C. longisporum* on *Carphochaete*, and *C. pereziae* on *Perezia*, *Uredo mexicensis* on *Leucaena* in Mexico; *Puccinia dyssodiae* on *Dyssodia* in Arizona and Mexico. New names are: *Coleosporium pacificum* (*C. madiae* Cooke nom. illegit.); *Puccinia ocellifera* (*P. biocellata* Vest., *P. plucheae* Arth. nom. illegit.) New status or new combinations are: *Puccinia arachidis* Speg. var. *offuscata* (*P. offuscata* Arth.), *P. calcitrapae* DC. var. *bardanae* (*P. bardanae* (Wallr.) Corda), *P. calcitrapae* var. *centaureae* (*P. centaureae* DC.), *P. cascadensis* (*P. albulensis* Magn. ssp. *cascadensis* Savile), *P. concinna* Arth. var. *duranii* (*P. duranii* Hennen, Leon-Gall. & Cumm.), *P. hieracii* (Roehl.) Mart. var. *harknessii* (*P. harknessii* Vize), *P. hieracii* var. *stephanomeriae* (*P. stephanomeriae* Syd.), *P. invelata* H. S. Jack. var. *echinulata* (*P. cognata* Syd. var. *echinulata* J. Parm.), *P. kuhniae* Schw. var. *brickelliae* (*P. brickelliae* Peck), *P. tanaceti* DC. var. *dracunculina* (*P. dracunculina* Fahr.) *P. variabilis* Grev. var. *insperata* (*P. insperata* H. S. Jack.), *P. variabilis* var. *lapsanae* (*P. lapsanae* Fckl.), *Uromyces appendiculatus* (Pers.) Unger var. *punctiformis* (*U. punctiformis* Syd.), *U. purus* (*Argomycetella pura* Syd., *Maravalia pura* (Syd.) Mains). *U. trifolii-repentis* Liro var. *fallens* (*Nigredo fallens* Arth.)

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COLEOSPORIUM ARIZONICUM Cumm. sp. nov.

Coleosporium aridum H. S. Jack. in Arthur Bull. Torrey Bot. Club 51:52. 1924. (Illegit. based on uredinia).

Spermogoniis et aeciis ignotis. Urediniis (*Uredo arida* Cumm. Mycologia 48:607. 1956) hypophyllis, conspicuis, saepe concentricis, primo aurantiacis tum pallide flavidis; sporis (18-)21-26(-29) x (17-)20-24 µm, variabilis sed pro parte maxima late ellipsoideis vel late obovoideis, membrana 2.5 µm crassa (cum verrucae), uniformiter verrucosa, fere hyalina. Basidiosoris hypophyllis, obscure aurantiacis, stratum exterius gelatinosum (5-)10-15 µm crassum in sicco corneus, ex basidiis 2-4 catenulatim compositis; basidiis (40-)45-60(-65) x (17-)19-23(-26) µm, cylindricis, statim germinantibus, basidiosporis 15-20 x 12-16 µm, late obovoideis.

Holotype: on *Brickellia californica* Torr. & Gray, Oak Creek Canyon N of Sedona, Arizona, Cummins 57-72 (PUR 56550); isotypes Solheim & Cummins Mycofl. Saximont. Exsic. No. 902. Also in California on the same host.

The urediniospore inner wall is 1 µm thick. This is adorned externally with flat topped, rod like "verrucae" about 1.5 µm high which may be discrete or merged in short irregular ridges.

COLEOSPORIUM DURANGENSE Cumm. sp. nov.

Spermogoniis, aeciis et urediniis ignotis. Basidiosoris hypophyllis, primo aurantiacis tum melleis, stratum exterius gelatinosum (8-)10-14 µm crassum in sicco corneus, ex basidiis 3 vel 4 catenulatim compositis; basidiis 60-75 (-80) x 18-22(-24) µm, plerumque cylindraceis, basidiosporis (18-)20-22(-24) x (15-)16-18(-20) µm, late obovoideis vel late ellipsoideis.

Holotype: on *Eupatorium calaminthaefolium* H.B.K., Mex hgw 40, km 1015, W of Durango, Dgo., Mexico, 25 Nov. 1963, Cummins 63-577 (PUR 62369). Not known otherwise.

Neither uredinia nor urediniospores adhering to gelatinized basidiosori could be found. The basidia are longer than those of *C. arizonicum* but basidial size is variable in *Coleosporium*. If the urediniospores, when found, correspond to those of *C. arizonicum* the species may need to be merged. Both occur associated with ponderosa pine.

COLEOSPORIUM INCOMPLETUM Cumm. sp. nov.

Spermogoniis ignotis, verisimiliter nullis. Aeciis hypophyllis, sparsis vel aggregatis, peridium brevis, inconspicuis, cellulis peridii plus minusve quadratis 20-35 µm longis, verrucosis, sporis (21-)23-30(-33) x (16-)18-22 (-24) µm, pro parte maxima ellipsoideis vel oblongo-ellipsoideis, membrana 3-3.5 µm crassa (cum verrucae), plus minusve unilateraliter verrucosis, hyalinis. Urediniis ignotis, verisimiliter nullis. Basidiosoris hypophyllis, aurantiacis, stratum gelatinosum exterius 18-25 µm crassus in sicco corneus, 1 vel 2 basidiis altus noncatenatus; basidiis (50-)58-66(-70) x 17-22(-26) µm, plerumque cylindraceis, basidiosporis 18-20 x 16-18 µm ovalis vel obovoideis.

Holotype: on *Stevia berlandieri* A. Gray, Mex hgw 40, near Espinosa del Diablo, Durango, Mexico near the border with Sinaloa, 29 Nov. 1971, Cummins 71-544 (PUR 64124). Not known otherwise.

This autoecious and apparently demicyclic species differs from *C. reichei* Diet. especially in the short inconspicuous peridium which, in *C. reichei*, is about 1 mm long and conspicuously peridermioid. The basidiospores of *C. reichei* are not known.

COLEOSPORIUM LONGISPORUM Cumm. sp. nov.
Aecidium carphochaetes Syd. Ann. Mycol. 1:20. 1903.

Spermogoniis et aeciis ignotis. Urediniis hypophyllis auranticis vel flavidis; sporis (23-)27-38(-44) x (16-)18-24(-27) µm, oblongo-ellipsoideis, ellipsoideis vel late ellipsoideis, membrana 3-4.5 µm crassa (cum verrucae), unilateraliter verrucosa, hyalina. Basidiosoris hypophyllis, aurantiacis, stratum gelatinosum exterius plus minusve 20 µm crassus in sicco corneus, 1 basidium altus; basidiis (55-)60-70(-80) x (16-)18-22 µm, cylindraceis, basidiosporis (20-)24-28(-30) x 11-14 µm, oblongo-ellipsoideis vel leniter allantoideis.

Holotype: on *Carphochaete grahamii* A. Gray, Mex hgw 40, km 1016 W of Durango, Dgo., Mexico, 26 Nov. 1963, Cummins 63-581 (PUR 62353).

Arthur (1924) treated Sydow's species as a synonym of *Coleosporium steviae* Arth. recognizing that it was not an aecial stage. The "verrucae" of the urediniospore wall are rod like or ridge like, 2-3 µm high, and with flat tops. They may merge variously on the coarsely sculptured side of the spore but decrease to become finely rugose or pseudoreticulate on the opposite side. New basidia may push up between the older ones but they are not catenulate.

COLEOSPORIUM PACIFICUM Cumm. nom. nov.
Coleosporium madiae Cooke Grevillea 7:102. 1879 (Illegit.: based on uredinia).
Stichopsora madiae Syd. Ann. Mycol. 2:30. 1904.

The first description of telia, albeit sketchy, is that of Sydow: "An einigen Blättern waren bereits junge Teleutolagern entwickelt. Es scheint, als ob auch bei dieser Art die Teleutosporen nicht einzeln, sondern reihenweise entstehen, ..." Arthur (1907) provided a more detailed description of telia, but under *Coleosporium madiae* Cooke. Cummins and Stevenson (1956) used *C. madiae* (Syd.) Arth., citing the N. Amer. Flora. *C. pacificum* is proposed because *C. madiae*, under whatever authorship, is a later homonym of *C. madiae* Cooke.

The type is that cited by Sydow for *Stichopsora madiae*: on *Madia sativa* Molina from California, collected by E. B. Copeland (S).

COLEOSPORIUM PEREZIAE Cumm. sp. nov.

Spermogoniis et aeciis ignotis. Urediniis hypophyllis, sparsis, primo aurantiacis tum pallide flavidis; sporis (18-)21-26(-29) x (17-)20-24 µm, plerumque oblongo-ellipsoideis vel late ellipsoideis, membrana 2.5-3 µm crassa (cum verrucae) plus minusve uniformiter verrucosa. Basidiosoris hypophyllis, obscure aurantiacis, stratum exterius gelatinosum 15 µm vel minus crassum in sicco corneus, ex basidiis 3 vel plus catenulatim compositis; basidiis 44-70 x 17-23 µm, cylindricis, basidiosporis 16-18 x 14-16 µm, obovoideis vel plus minusve napiformis.

Holotype: on *Perezia thurberi* A. Gray, Mex hgw 45 near km 177 S of Durango, Dgo., Mexico, 19 Oct. 1971, Cummins 71-209 (PUR 65365). Also known on *P. reticulata* (Lag.) A. Gray, *P. rigida* (DC.) A. Gray in Durango and on *P. wrightii* A. Gray in Nuevo Leon.

These are the first records of a species of *Coleosporium* on the tribe Mutisieae of the Compositae. This species is one of a few that have truly catenulate basidia; in most others the new basidia may crowd up among the older and collapsed ones to give a pseudocatenulate appearance.

PUCCINIA ARACHIDIS Speg. var. *OFFUSCATA* (Arth.) Cumm. stat. nov.

Puccinia offuscata Arth. Bull. Torrey Bot. Club 47: 469. 1920.

P. offuscata on species of *Zornia* differs from *P. arachidis* in having 2-4, commonly 3, germ pores in the urediniospores and somewhat paler teliospores. There are no significant size differences. The aecial stage is not known for either. The holotype of *P. offuscata* is C. F. Baker No. 2143 (PUR 36786) on *Zornia diphylla* (L.) Pers. from Herradura, Cuba.

Species of *Puccinia* are rare on legumes. Recognizing this, Savile (1971) suggested that *P. arachidis* and *P. offuscata* "... probably belong elsewhere" but without deciding where. The discovery of spermogonia and aecia will be needed to decide the matter.

PUCCINIA CALCITRAPAE DC. var. *BARDANAE* (Wallr.) Cumm. comb. nov.

Puccinia inquinans bardanae Wallr. Fl. Crypt. Germ. 2: 219. 1833.
Puccinia bardanae (Wallr.) Corda Icones Fung. 4:17. 1840.

This variety has uniformly echinulate urediniospores whereas var. *centaureae* has urediniospores with a smooth zone just above the hilum. The significance of this difference is open to question. I have not seen the type.

PUCCINIA CALCITRAPAE DC. var. *CENTAUREAE* (DC.) Cumm. stat. nov.

Puccinia centaureae DC. Flore Fr. 5:59. 1815.
Puccinia carthami Corda Icones Fung. 4:15. 1840.
Puccinia laschii Lager. Tromsoe Mus. Aarsh. 17:63. 1895.
Puccinia irrequisita H.S. Jack. in Arthur Bull. Torrey Bot. Club 48:32. 1921.

The variety occurs in North America on *Carthamus* *tinctorius* L. *Centaurea americana* Nutt., *C. nigra* L. and species of *Cirsium*. The holotype is on *Centaurea*, environs de Mende, Prost (G).

Savile (1970) recognized the above listed entities as species and added *P. laschii* var. *xerophylla* Savile. But these fungi have the principal characters in common i.e., uredinoid aecia, teliospores with small verrucae, depressed pores with slight or no umbonate caps, fragile pedicels and similar sizes, and urediniospores with 3 equatorial pores with slight or no "caps", a smooth zone basally and a wall conspicuously thicker at the hilum than elsewhere.

PUCCINIA CASCADENSIS (Savile) Cumm. stat. nov.
Puccinia albulensis Magn. ssp. *cascadensis* Savile Can. J. Bot. 46:632. 1968.

P. albulensis is characterized by systemic infections, whereas ssp. *cascadensis* produces only local infections, and the teliospores are morphologically distinct. To consider the two fungi as belonging to a single species exceeds credibility, hence the elevation of ssp. *cascadensis* to specific rank.

PUCCINIA CONCINNA Arth. var. *DURANII* (Hennen, Leon-Gall. & Cumm.) Cumm. stat. nov.
Puccinia duranii Hennen, Leon-Gall. & Cumm. Southw. Nat. 16:367. 1972.

This fungus has dimorphic teliospores, the large ones mostly 40-48 x 27-29 µm and the small ones mostly 29-35 x 21-25 µm. The teliospores of *P. concinna* var. *concinna* are mostly 40-52 x 25-32 µm. The wall is minutely rugose or rugose reticulate in both and there is no appreciable difference in the urediniospores. Aecia are not known. *Eupatorium greggii* Gray is the host of both. The holotype of var. *duranii* is Hennen No. 69-152 (PUR 63275) from south of Hidalgo del Parral, Dgo., Mexico.

PUCCINIA DYSSODIAE Cumm. sp. nov.

Spermogoniis, aeciis et urediniis nullis. Teliis sparsis vel aggregatis, amphigenis et caulicolis, plus minusve erumpentibus, compactis, atro-brunneis, paraphysibus brunneis aggregatis paucis sed soris non-loculatis, stratum sporogenus castaneo-brunneus; sporis (39-)44-60(-65) x (17-)18-23(-25) µm, variabiles sed pro parte maxima elon-

gato-clavatis vel oblongo-ellipsoideis, ad apicem late rotundis vel plus minusve obtusis, membrana ad latere (1.5-)2-2.5(-3) µm crassa apicem versus plerumque 2.5-4 µm crassa vel ad apicem (5-)7-9(-11) µm, castaneo-brunnea, levis, pedicello usque ad 50 µm plerumque 35-40 µm longo persistenti, brunneolo.

Holotype: on *Dyssodia pentachaeta* (DC.) B. L. Rob., 3 miles N of Portal, Arizona, 14 Sept. 1961, Cummins 61-173 (PUR 59039). Also known from one collection in Nuevo Leon State, Mexico on *D. greggii* (Gray) B. L. Rob.

Dyssodia is a genus of the tribe Helenieae of the Compositae. The fungus was reported as *Puccinia grindeliae* Peck by Hennen, Leon-Gallegos and Cummins (1972) but differs markedly in having groups of stromatic paraphyses and teliospores with relatively short pedicels.

PUCCINIA HIERACII (Roehl.) Mart. var. *HARKNESSII* (Vize) Cumm. stat. nov.
Puccinia harknessii Vize Grevillea 7:11. 1878.

This variety differs from *hieracii* var. *hieracii* principally in having the teliospore wall 2-2.5(-3) µm thick and teliospore pedicels that reach 110 µm long and tend to be persistent. These differences may reflect the arid regions in which the fungus occurs on species of *Lygodesmia*, *Malacothrix*, and *Rafinesquia*.

There being no original material in K, I designate the following neotype: Harkness No. 742 (PUR 34727; isotype NYS) on *Lygodesmia spinosa* Nutt., Mt. Rosa, Nevada, 7000 ft. This is in accord with the listing of "*P. Harknessii* n. sp. Vize" in Harkness and Moore (1880).

PUCCINIA HIERACII (Roehl.) Mart. var. *STEPHANOMERIAE* (P. Syd. & H. Syd.) Cumm. stat. nov.
Puccinia stephanomeriae P. Syd. & H. Syd. Monogr. Ured. 1:157. 1902.
Puccinia harknessii major Arth. Manual Rusts U.S. and Canada. p. 353. 1934 (Illegit.; trinomial).

This variety is similar to var. *harknessii* but the urediniospores mostly are 30-36 x 25-30 µm vs 23-26 x 19-24 µm and the teliospores are mostly 35-46 x 23-28 µm vs 33-40 x 21-25 µm. The pedicel is semipersistent. The holotype is on *Stephanomeria cichoriacea* Gray, Pasadena, California,

McClatchie (S).

PUCCINIA INVELATA H. S. Jack. var. *ECHINULATA* (J. Parm.) Cumm. comb. nov.

Puccinia cognata P. Syd. & H. Syd. var. *echinulata* J. Parm. Can. J. Bot. 45:2287. 1967.

It is my opinion that var. *echinulata* is related to *P. invelata* rather than to *P. cognata* and that *P. cognata* var. *fraseri* J. Parm. and *P. parthenices* H. S. Jack. are synonymous with *P. invelata* var. *invelata*. The holotype of var. *echinulata* is on *Verbesina turbacensis* H.B.K., Zunil, Guatemala, Standley No. 83189 (PUR 49983).

PUCCINIA KUHNIAE Schw. var. *BRICKELLIAE* (Peck) Cumm. stat. nov.

Puccinia brickelliae Peck Bull. Torrey Bot. Club 12: 34-35. 1885.

This variety differs from other varieties of *P. kuhniae* in having the pore of the lower teliospore cell always next to the septum. The teliospores vary in shape and size, the pedicels vary but may be at least 200 μm long and sometimes have sterile branches.

The holotype in NYS bear these data: on *Brickellia*, Bowie, Arizona, M. E. Jones No. 541 but the published record reads "On living leaves of Brickellia. Arizona. September. M. E. Jones". The host unquestionably is *B. coulteri* Gray. Robinson (1917) cites a Jones specimen from Bowie, but without other data.

PUCCINIA OCELLIFERA Cumm. nom. nov.

Puccinia biocellata Vest. Micromycetes rar. sel. Nos. 1267, 1368. 1908 (Illegit.; perfect state not described).

Puccinia plucheae Arth. Bull. Torrey Bot. Club 49:194. 1922 (Illegit.; perfect state not described).

Dicaeoma plucheae Arth. & H. S. Jack. N. Amer. Fl. 7: 793. 1926 (Illegit.; telia described but the name a later homonym if used in *Puccinia*).

Puccinia biocellata Vest. ex Cumm. Mycologia 48:606. 1956 (Illegit.; telia described but the name a later homonym).

All descriptions of telia and teliospores are based on Vestergren's specimens. The type, designated by Cummins (loc. cit.), stands: on *Pluchea fastigiata* Griseb., Quinta near Laguna de la Brea, Prov. Jujuy, Argentina, June 13, 1901, Vestergren (Microm. rar. sel. No. 1368; holotype in the BPI bound set).

PUCCINIA TANACETI DC. var. *DRACUNCULINA* (Fahr.) Cumm. stat. nov.

Puccinia dracunculina Fahr. Ann. Mycol. 39:181. 1941.

Variety *dracunculina* differs from var. *tanaceti* mainly because the urediniospores are 17-20 µm wide vs 22-28 µm. The host plant is *Artemisia dracunculus* L. (*A. glaucus* Pall., *A. dracunculoides* Pursh). Fahrendorf did not designate a type, hence I have selected, from specimens cited by him, the following lectotype: on *A. dracunculoides*, Boulder, Colorado, Bartholomew and Bethel (PUR 37727; isotypes Barth. F. Columb. No. 2753).

P. tanaceti var. *tanaceti* is represented in North America by *Puccinia chrysanthemi* Roze, which I consider to be synonymous.

PUCCINIA VARIABILIS Grev. var. *INSPERATA* (H. S. Jack.) Cumm. stat. nov.

Puccinia insperata H. S. Jack. Brooklyn Bot. Gard. Mem. 1:253. 1918.

The holotype is on *Prenanthes alata* (Hook.) Griseb., Hood River Valley, Oregon, Jackson No. 3265 (PUR 34812).

This variety and var. *lapsanae* differ from variety *variabilis* because the urediniospores have 2, rarely 3, pores, whereas var. *variabilis* has 3, rarely 2, pores. Variety *insperata* has teliospores mostly 26-33 x 17-21 µm; those of var. *lapsanae* are mostly 26-29 x 19-23 µm. The three varieties are similar morphologically in all spore stages and are of northern distribution.

PUCCINIA VARIABILIS Grev. var. *LAPSANAE* (Fckl.) Cumm. stat. nov.

Puccinia lapsanae Fckl. Jahr. Nass. Ver. Nat. 15:13. 1860.

The holotype is on *Lapsana communis* L., near Oestrich in Nassau, Germany (G). The American host plant is the same.

UROMYCES APPENDICULATUS (Pers.) Unger var. *PUNCTIFORMIS* (P. Syd.) Cumm. stat. nov.

Uromyces punctiformis P. Syd., Sydow Uredineae No. 1513. 1901.

Variety *punctiformis* differs from var. *appendiculatus* because most teliospores are 35-40 x 28-31 µm vs 28-33 x 22-27 µm and the teliospore pedicel is thick walled. The holotype on *Ramarizella strobiliformis* (B. L. Rob.) Rose (*Vigna* s.), Guadalajara, Jal., Mexico, Holway (S; isotypes Sydow Ured. No. 1513) is the only record.

UROMYCES PURUS (H. Syd.) Cumm. comb. nov.

Argomycetella pura H. Syd. Ann. Mycol. 23:313. 1925.
Maravalia pura (H. Syd.) Mains Bull. Torrey Bot. Club 66:178. 1939.

The type of the genus *Maravalia* is *M. pallida* Arth. & Thaxt. on *Pithecellobium latifolium* (L.) Bernh. and only telia are known. *U. purus* and *U. pressus* Arth. & Holw. (*M. pressa* (Arth. & Holw.) Mains have the kind of spermogonia and uredinoid aecia that occur in many species of *Uromyces*. Both parasitize species of *Vernonia*. I believe that they belong in *Uromyces*.

UROMYCES TRIFOLII-REPENTIS Liro var. *FALLENS* (Arth.) Cumm. comb. nov.

Nigredo fallens Arth. N. Amer. Fl. 7:254. 1912.

This variety is generally similar to var. *trifolii-repentis* except the pores of the urediniospores often are 3 or 4, vs 2 or 3, or usually 3 or 4 more or less equatorial and 1 in or near the apex. I am designating as neotype: on *Trifolium pratense* L., Emporia, Kansas, 3 Nov. 1903, J. E. Bartholomew (PUR 15322; isotypes Barth. N. Amer. Ured. No. 685).

UREDO MEXICENSIS Cumm. sp. nov.

Soris subcuticularibus amphigenis, frequenter circinatem aggregatis, interdum nervicolis, paraphysibus peripherales capitatis, brunneis, capitulum (10-)14-20(-25) µm latus, membrana ad apicem 2-3.5(-4) µm crassa deorsum 1.5 µm crassa; sporis (20-)23-29(-33) x (11-)13-17(-19) µm, pro parte maxima obovoideis, membrana ad apicem 2.5-4(-5) um crassa deorsum 1.5-2.5(-3) µm crassa, uniformiter echinulata, echinulae inter se 1.5-2.5(-3) µm, poris germinationis (3)4-6, equatorialibus.

Holotype: on *Leucaena macrocarpa* Rose, Mex hgw 40, km 280 east of Malpica, Sin., Mexico, 1 Dec. 1971, Cummins No. 71-568 (PUR). There are three other collections from coastal areas of Colima and Jalisco states of Mexico.

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MYCOTAXON

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THE OCCURRENCE OF AMYLOID PLUGS IN THE ASCI OF ASCOTRICHA ERINACEA[1]

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SUMMARY

Ascotricha erinacea has been isolated and cultured, for the first time, from elephant dung collected in Kenya and Tanzania. The disposition of A. erinacea within the Xylariaceae on account of the amyloid apical plug in the ascus tip and the Dicyma conidial state is proposed. A revised description and illustrations are provided.

INTRODUCTION

The genus Ascotricha was erected by Berkeley (1838) for a single species A. chartarum Berk., which was found on paper. Cooke(1871) and Saccardo(1882) accepted the genus as distinct from Chaetomium Kunze ex Fr. Ascotricha was treated by Winter(1887) in the family Chaetomiaceae along with Chaetomium and Chaetomidium(Zopf)Sacc. Clements and Shear(1931) followed Winter's concept of the genus, but placed it in the family Sphaeriaceae. For a complete review of the history and taxonomic concept of the genus Ascotricha see Hawksworth(1971).

The species of Ascotricha are cosmopolitan in distribution and grow well on any cellulose-rich substrate. This report represents a new and interesting record from Kenya and Tanzania. The material and methods followed in this study are the same as described earlier by Khan and Cain(1972). A. erinacea Zambett has been isolated in pure culture on Weitzman and Silva-Hutner's medium(1967) and deposited with the Plant Research Institute, Ottawa(DAOM 142684), American Type Culture Collection(ATCC 24707), Centraalbureau voor Schimmelcultures(CBS 535.73), and Commonwealth Mycological Institute(IMI 174497).

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TAXONOMY

Ascotricha erinacea Zambett. , Bull. Soc. Bot. Fr. 102: 225. 1955. Figs. 1-12.

Colonies on Weitzman and Silva-Hutner's medium attaining a diameter of 5 cm. in 4 weeks at 28°C, slow growing, dark olivaceous, velvety to felty, margin lighter in colour, smooth to wavy, reverse dark grey. Perithecia pyriform, occasionally subglobose, 70 - 150µ diam. , olivaceous to dark brown by transmitted light, nearly black by reflected light; neck distinct and short, ostiolate, with conidiophores arising from it and adjacent areas; peridium membranaceous to semicoriaceous, dark brown to black, thick-walled, textura epidermoidea in surface view, 2-4 cells thick in cross-section. Asci 8-spored, cylindrical, thin-walled, persistent, 70 - 85 x 11 - 14µ, rounded at the apex, ending abruptly in a short stipe; apical plug staining blue with Melzer's reagent(Iodine-positive). Ascospores one-celled, ellipsoidal, 11 - 16 x 6.5 - 9µ, uniseriate, hyaline at first, then becoming olivaceous to light brown, finally dark brown to opaque at maturity, with a distinct longitudinal germ slit, forcibly discharged onto the cover of a Petri dish. Conidiophores arising independently from the substrate mycelium and the outer peridial cells around the perithecial neck, dichotomously or sympodially branched, 2.5 - 6.0µ diam., thick-walled, dark brown, with sharp pointed terminal ends. Conidia(Sympodulospores) ellipsoidal, ovoid or subglobose, 4.5 - 7 x 3 - 4.5µ, smooth, hyaline, arising as blown out ends at the apex of simple or branched conidiophores.

HOLOTYPE: on paper, Bibliothèque Nationale, Paris, France, sine dato, Nicot, herb. Zambettakis 1012(PC).

SPECIMENS EXAMINED: KENYA: Mt. Kenya, Kamweti, 0°23'S, 37°20'E, elev. 6800 ft, elephant dung, 11 July 1966, Cain, Griffin and Krug, TRTC 66.327c. TANZANIA: Ngurdoto Crater, 3°15'S, 36°55'E, elev. 3000 ft, elephant dung, 10 August 1966, Cain, Griffin and Krug, TRTC 66.1093m.

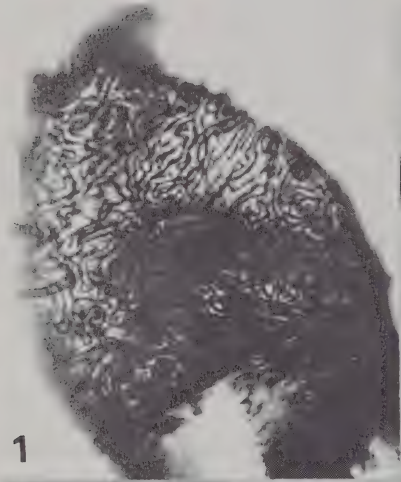
DISCUSSION

When the asci of A. erinacea were stained with Melzer's reagent each was found to contain a distinct amyloid apical plug which previously has never been reported in any species of Ascotricha. Moreover, the conidiophores arising from the neck region superficially resemble the terminal hairs found in the genus Chaetomium. These conidiophores are straight, pointed, dichotomously or sympodially branched and do not hold the ascospores in a cirrhus, as they are shot out forcibly by the ejection of the amyloid apical plug. The ascospores always have a longitudinal germ slit.

This is a very slow growing species compared with the species of Chaetomium which usually take 10 to 15 days to cover a 9 cm. Petri dish culture. All of these characteristic features of A. erinacea as exemplified in the specimens from Kenya and Tanzania clearly indicate that this species does not belong in the Chaetomiaceae, but should be placed in the Xylariaceae. The ornamentation on the terminal hairs in ninety two species of Chaetomium and representatives of similar genera has been examined under scanning electron microscopy by Hawksworth and Wells(1973). They report a similar ornamentation on the terminal hairs of Chaetomium, Achaetomiella von Arx, Chaetomidium, and Thielavia Zopf; but no ornamentation on the hairs in Ascotricha, Farrowia D. Hawksw. (as Chaetoceratostoma Turc. & Maffei), Coniochaeta(Sacc.)Massee, Kernia Nieuwl., and Lophotrichus Benjamin. Thus, at least, on the basis of the nature of the surface of terminal hairs, these two groups of genera are quite different phylogenetically. These observations on the terminal hairs support our conclusion that Ascotricha should be placed in the Xylariaceae.

In order to confirm our observations for other species of the genus, herbarium(TRTC) material of A. amphitricha (Corda)Hughes and A. chartarum was examined. Since the asci are usually very evanescent it was not surprising to observe that all collections in our herbarium lacked asci. Likewise attempts to germinate the ascospores from this material, even when subjected to heat and chemical treatments, were not successful. Consequently, it was not possible to confirm the presence of amyloid apical structures in these taxa. When cultures become available for these as well as the other remaining species, the asci should be re-examined to determine the presence or absence of amyloid apical plugs. However, whether the asci have these structures or are evanescent is not considered significant at the generic level.

Ascotricha is distinguished from Chaetomium on the basis of the distinct neck on the perithecia,the amyloid plug in the asci, and the prominent germ slit in the ascospores. Hawksworth(1971) has emphasized a number of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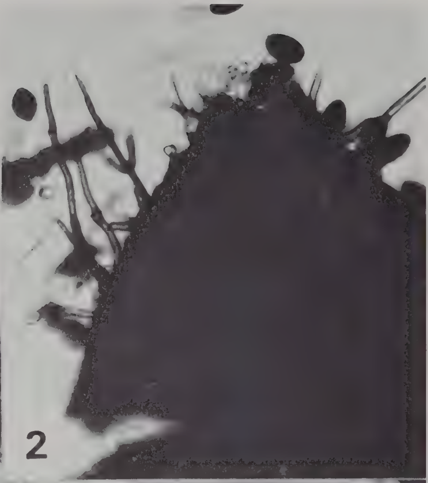
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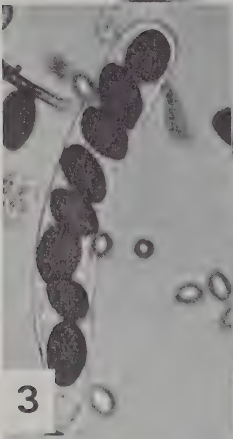
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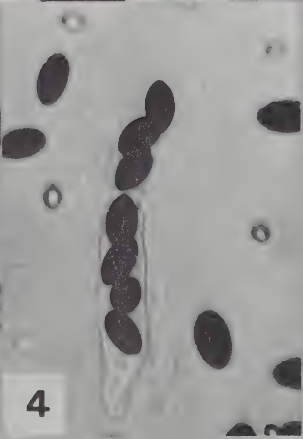
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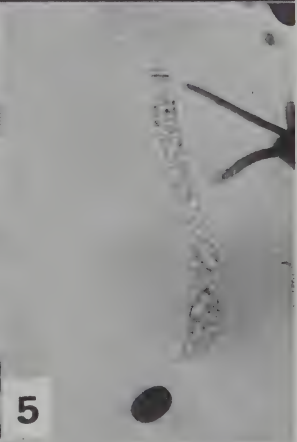
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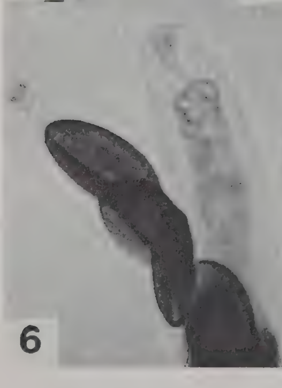
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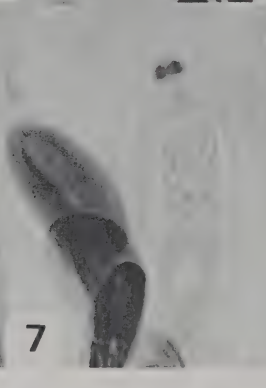
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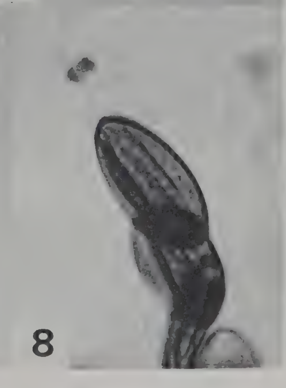
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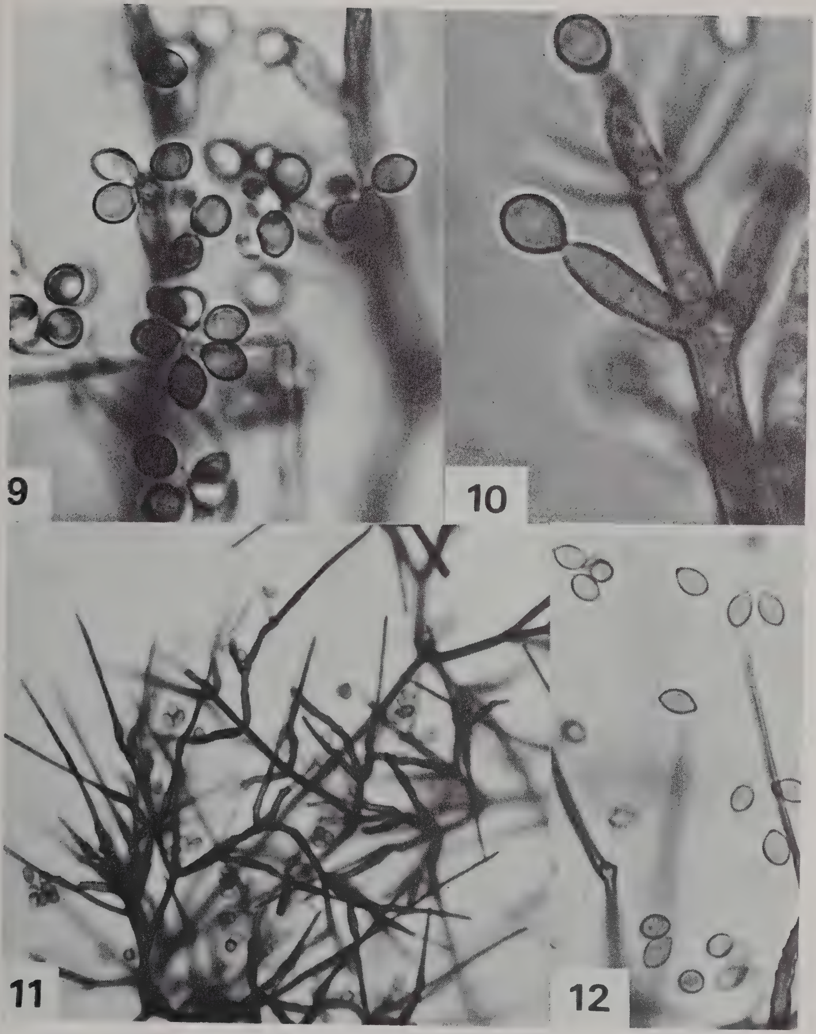

Figs. 1-12. *Ascotricha erinacea*. 1. Perithecium in surface view, x365. 2. Perithecium with conidiophores, x365. 3-4. Asci, x585. 5. Young ascus, x585. 6-8. Apical amyloid plugs after staining with Melzer's reagent, x1245. 9. Conidiophores and conidia, x1355. 10. Conidium arising at the apex of branched conidiophore, x1465. 11. Conidiophores showing the typical branching, x365. 12. Conidiophores and conidia, x805.

additional characters including the shape and colour of the ascospores as well as the kind, ornamentation and shape of the terminal hairs. The conidial state for species of Ascotricha belongs to Dicyma Boul. , while in Chaetomium it is never reported as such. Where known, it is usually referred to Botryotrichum Sacc. & March.

Such features as the vestiture of the perithecium presence or absence of the apical structures, the evanescent nature of the ascus, presence of paraphyses, the spore size and pigmentation, and the number of germ pores do not appear to be reliable above the generic, or in some instances the specific level. Consequently, the inclusion of Chaetomium in a separate family Chaetomiaceae would seem to be open to question since there is no valid reason for excluding it from the Sordariaceae.

ACKNOWLEDGEMENTS

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SOME INSIGHTS INTO THE MYCOLOGICAL WORK OF JOHN JACOB DILLEN

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Summary

Attention is drawn to the mycological contribution of Dillenius in his "Catalogus," and to other reliquiae at the University of Oxford Herbarium and library.

In early 18th century, few botanical authors gave attention to cryptogamic plants. Tournefort had lately expounded on the concept of genus, and his idea had gained some acceptance. In the small town of Gisse, Germany, John Jacob Dillen (1684-1747, wrote under his Latinized name, Dillenius) wrote a local flora of the plants in the neighborhood of the town, arranging the plants by the month, or perhaps more accurately, the season of the year in which each was most easily identified. Although the higher plants were included and emphasized, Dillen devoted substantial space to the cryptogams - the fungi, mosses, and ferns. As will be developed below, his interest in the fungi was more than passing, and for the first time, Tournefort's few genera of fungi were split and expanded (cf. Druce & Vines, 1907) (see Table I). Because the genera of Dillen were more easily discerned, Micheli (1729) used almost all of Dillen's names, and Linnaeus (1735, as 1830) had both Dillen's generic names and those several of Micheli from which to choose. In some instances, Linnaeus's choice (viz. his choice of *Hydna* to wholly replace *Erinaceus* Dillen) was to be both ironic and significant in later nomenclatural situations. Dillen's (1718, 1719) "Catalogus" of the plants around Gisse was, because of its increased coverage of the fungi, a substantial contribution to the thinking of Linnaeus on this group (cf. Ainsworth, 1976; Lütjeharms, 1936), and so on authors subsequent to Linnaeus, including the "founding Fathers" of mycology, C. H. Persoon and E. M. Fries. Dillen kept no fungus herbarium, and practically nothing has been known about the fungi included in Dillen's "Catalogus." For this reason, and to clarify the specific matter of the typification of *Hydnum* Linn. per Fries, I travelled to the University of Oxford, where Dillen by the terms of the will of William

Sherard, held the first Sherard Chair of Botany, and where the reliquiae of Dillen and Sherard reside in the University Herbarium, the Botany Department library, and the Bodleian Library.

At least five separate sets of illustrations, none published, are known to exist in Dillen's materials. They are as follows.

1). Some years ago, a portfolio of colored aquarelles executed by Dillen* was catalogued in the Botany Department library. It was borrowed by an historian of mycology through another institution, and apparently never returned, although item no. 2 below *was* returned in its place. These plates of English fungi were seen and reported on by Massee (1907) in some detail, but their whereabouts are not presently known. They obviously represented fungi described in Dillen's proposed revision of Ray's "Synopsis," which was never published. Although they must clearly have illustrated Dillen's concepts of the taxa in the "Synopsis" (which Dillen had already revised and published under Ray's name in order to ensure higher sales), their importance to the pre-Linnaean literature is significantly less than illustrations for the "Catalogus" of Gisse plants.

2). A portfolio of colored aquarelles (exact number - at least 110 taxa represented - size not measured, unfortunately), on the cover of which appears (in Dillen's hand) *"Fungi Catal*[*o*]*gi Gissensis* [and in smaller script] *de ea referentes.*" While the "Fungi Anglici" portfolio is valuable as a voucher for Dillen's later taxonomic concepts, the Gisse portfolio in invaluable, for Dillen directs the user of the "Catalogus" to the portfolio as a reference work. Even Linnaeus, who travelled to Oxford at the bidding of Dillen in 1737, and who made a great impression on Dillen, had an opportunity to see and refer to this portfolio, which must have been assembled at or before the time of publication of the "Catalogus" in 1718. Whether or not Linnaeus actually saw it or not, of course, is not known.

In format the portfolio is interesting. On each page appears a colored aquarelle of a single taxon, executed on different paper from that of the portfolio itself, cut out and pasted in the portfolio. Below each illustration is printed (by Dillen, but in rather formal script) the description of the taxon as it appeared in the "Catalogus" (but without notes on the month of appearance), and a reference to the appropriate page in the "Catalogus," if such exists, for many more fungi are illustrated than are described in the "Catalogus."

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*MS Sherard no. 209. Fungi Anglici depicti ad seriam Synopsis Stirpium Britanniae J. Raii, Edit. 3. Aliique inventi & depicti post ejusdem Libri Editionem editam. 264 drawings and manuscript note, 14.5 X 10 inches.

In at least one instance, the description has been changed. On colored plate 52 (lower) is written, "*Boletus parvus, pileo* (*non pediculo*) *tenui variegato. Cat. Giss.* 189." In the copy of the "Catalogus" in the Botany library, the description reads, "*Boletus parvus, pediculo tenui variegato...,*" but the word "*pediculo*" is crossed out, and the word "*pileo*" inserted above it, in the characteristic brown ink and hand of Dillen, thus attesting that this copy of the book was Dillen's own.

Occasionally, an illustration lies loose in the portfolio, although another of the same fungus (in the same pose) is mounted in the normal fashion. In one instance (colored plate 66), the loose illustration's caption reads "*Agaricus luteus villosus, Carpini.* 1716. Dec." The description in the portfolio itself is more complete, refers to "Cat. 193" (where the same description is printed), but omits "1716. Dec.," which appears in the "Catalogus" itself. It might be conjectured that such loose illustrations were not satisfactory to Dillen (and indeed they are somewhat less detailed than the mounted aquarelles) and so were not used for the portfolio. But they may well have been the basis from which the printed descriptions in the "Catalogus" were written, for, even though the fungi appear in the chapter of October-November, under "*Agaricus luteus* ..." appears "Dec."

In certain places, pencil sketches substitute for colored aquarelles. For the most part, these sketches are wholly in pencil, but in at least two instances, pencil was used to "complete" a colored aquarelle (cf. more on this subject below).

Insofar as I know, no one has published any commentary on this portfolio, nor has it been critically examined in order to correlate the printed descriptions in the "Catalogus," the colored aquarelles, and modern taxonomic concepts to arrive at modern names for the fungi illustrated. Some are easy (*Clavariadelphus pistillaris, Armillaria mellea,* etc.), but others are more difficult.

3). In the back of the portfolio (cf. 2 above) there are several similar colored aquarelles, executed, usually, several to a page, on somewhat different, rougher paper than that of the portfolio itself (unfortunately, the paper of these loose illustrations was not critically compared with that of the cut and pasted illustrations mounted *in* the portfolio). In several instances, these illustrations are nearly identical to those in the portfolio (for example, colored portfolio illustrations 38 and 40 are to be found also in the loose sheets in the back). In almost every case, these loose illustrations are less detailed than those of the portfolio itself, and invariably the captions are less detailed, and in normal script rather than the formal printing of the portfolio. In some cases, portions of these sheets have been cut out, presumable to be pasted somewhere, perhaps in the portfolio.

I concluded that these loose illustrations were sketches, with rudimentary descriptions in note form. Presumably, when such sketches were acceptable to Dillen, he cut them out and transferred them to the portfolio (in no case could a cut-out area be found with the description left behind, so that it could be compared with those in the portfolio to ascertain whether the shape of the cutout could be matched with that of the pasted illustration in the portfolio). In most instances, the sketches were too rough, and the illustrations for mounting in the portfolio were executed again from start.

4). Separate from all of the above is a set of 11 plates (numbered Tab. I - XI), composed of black-and-white aquarelles (!), cut out, pasted on smaller sheets of paper (perhaps 25 X 20 cm), and numbered (arabic) consecutively within each sheet. They surely represent a set of plates from which to lithograph for a publication.

In the "Catalogus" the illustration of *Erinaceus* (the only fungus represented) was a lithograph (executed by Dillen, as were all the plates in the "Catalogus"). One of the black-and-white aquarelles is a very close match for that original lithograph, indicating that one was taken from the other (with no conclusion as to which was the original and which the copy).

Upon closer examination, it was found that many of the colored aquarelles of the "Gissensis" portfolio were matched by black-and-white aquarelles of the Tabulae. A few of these matches are given in Table II, but I suspect that if each black-and-white were thoroughly searched for in the portfolio, it would be found. In a few cases, the black-and-white illustration is matched by a pencil sketch in the portfolio, but again there is no way to ascertain which illustration served as the model for the other.

5). Loose within the black-and-white plates there is a small corner of a single sheet, with only a portion of a pen-and-ink illustration of a mushroom and "Tab. I" shown. The corner is margined with a double line, however, nearly exactly as are the plates of the "Catalogus." The portion of mushroom matches one figure of the black-and-white aquarelles, indicating a relationship between the two, but the placement of the figure is different in each, so it is impossible to ascertain the model and the copy. This small fragment is indicative, however, that all or some of these figures were to be rendered into lithographs and printed.

As stated already, the exact relationship between these various sets of illustrations cannot be ascertained. The only fungus illustrated in the "Catalogus" is *Erinaceus*. The plate in the "Gissensis" portfolio is entirely different fro the illustration in the "Catalogus," but an almost identical illustration appears in the black-and-white aquarelles, indicating a possible relationship between the

Table I

Dillen Equivalents to Tournefort's Fungus Genera

Tournefort's Name	Dillen's Name	Modern "Equivalent"
Fungus	Amanita	Agaricoid forms
	Erinaceus	Hydnoid forms
Fungoides	Peziza (membranacei)	Discomycetes, s. l.
	Peziza (Duriores)	Bird's nest fungi
Boletus	Morchella (Scrobiculis excavatus)	Morchella, phalloids
	Boletus (porosi)	Boletus, s. l.
Agaricus	Agaricus (lamellati)	Lenzites, Daedalea, Panus
	Agaricus (porosi)	Polypores
Lycoperdon	Bovista	Puff balls
Coralloides	Fungoides (with three subdivisions)	Clavarioid forms
Tubera	Tubera	Truffeloid forms

Table II

Equivalents between "Gissensis" portfolio and Black-and-white aquarelles

"Gissensis" portfolio		Black-and-white aquarelles	
No. 15,	lower left	Tab. II	no. 10
21,	upper left	IV	4
22,	lower right	II	11
22,	lower left	III	5
23,	lower left	IV	8
28,	lower pencil sketch	III	9
28,	upper right	IV	12, 13
30,	lower right (larger)	V	7
31,	lower left	V	3
32,	upper left, inner	V	4, with changes
32,	upper right	V	5
32,	lower	V	6
33		VII	1
34		VII	1
35,	upper, combines into	VIII	1
47,	left	IX	1
48,	right	X	1
48,	left	X	4
49		IX	2
52,	upper (pencil	X	3
55,	upper left	IX	3
55,	upper middle	IX	4
56,	lower left (pencil)	IX	5
70,	upper left	XI	9
72,	lower right (pencil)	VI	5
76,	upper left	VI	3

black-and-whites and the "Catalogus," bypassing the "Gissensis" portfolio. Some or all of the black-and-whites were intended for publication (cf. no. 5 above), but were never produced in published form.

Clokie (1964) mentioned that in the Oxford library was to be found a printed sheet "consisting of three title-pages of works projected by Dillenius. (a) One for another edition of the *Catalogus plantarum circa Gissam nascentium*..." This may well account for the black-and whites which are in roughly publishable form, and/or the fragment labelled "Tab. I."

The colored "Gissensis" portfolio's intent is obvious by Dillen's own words - it is to be used as a reference work for the identification of the fungi in the "Catalogus."

Dillen also compiled "Historia Muscorum," another example of his preoccupation with the cryptogams. An extensive herbarium serves as the reference source for that book, and assumedly failing to preserve the fungi, Dillen sought to secure his taxonomic concepts by executing the various collections of illustrations. His "Gissensis" portfolio and his "Fungi Anglici" portfolio are, therefore, valuable contributions to pre-Linnaean mycology.

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NOTES ON TWO AMERICAN HYALOSCYPHACEAE ON ASPEN

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SUMMARY

Dasyscyphus populicola (Seaver) McKnight and *Perrotia populina* (Seaver) Dennis, two members of the Hyaloscyphaceae found on *Populus tremuloides* Michx. are discussed. Detailed descriptions, illustrations and a discussion of their environmental adaptations are given. *Dasyscyphus populicola* was found to have an efficient hygroscopic mechanism for fruit body expansion and to fruit in the Spring, while *P. populina* lacks this mechanism and fruits later.

Among the fungi which inhabit aspen groves and aspen-conifer forests of the western United States, two species of Hyaloscyphaceae have been a source of taxonomic confusion.

In the original descriptions of *Lachnella populicola* and *L. populina*, Seaver (1951) commented on their macroscopic similarity. However, he found that microscopic characters were adequate to distinguish them. Dennis (1963) recognized that they should be in separate genera but left the specific identity of *L. populicola* in doubt. Based on comparative studies of both live and herbarium specimens, including types, McKnight (1976) transferred *L. populicola* to *Dasyscyphus*. Detailed descriptions, illustrations and a discussion of adaptation to environmental conditions are given here for each species.

DASYSCYPHA POPULICOLA (Seaver) McKnight, Mycologia 68: 1131. 1976.

= *Lachnella populicola* Seaver, N. Amer. Cup-Fungi (Inoperculates), p. 270. 1951.

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[1] Published by permission of the Director, New York State Museum and Science Service, Journal Series No. 191.

(Illustrations: FIGS. 1-14, 30)

Apothecia: superficial, gregarious to crowded, sometimes forming contiguous or nearly contiguous masses, arising singly from the substrate which is often blackened by superficial hyphae, centrally stipitate, covered with brown hairs.

Receptacle: salverform or goblet-shaped, often splitting radially at maturity, red-brown, covered with concolorous hairs which are long and dense at the margin and short and sparse at the base, and appearing globose on drying.

Disc: 1.5 mm in diam, cupulate when young, becoming expanded and nearly planate when mature, and cupulate again on drying, dingy white to cream, concealed in dried material.

Stipe: 0.5 mm long, 0.3 mm thick, concolorous with receptacle, showing white medulla when broken.

Asci: cylindrical or clavate with hemispherical to conical apex and tapered base, (40-) 5-65 (-70) × 4.5-6.0 (-8.0) µm, distinct J+ pore plug, 8-spored, thin-walled except at the apex which is 1-2 µm thick near the pore, often subtended by a crozier.

Ascospores: 7.0-9.0 (-13.0) × (1.8-) 2.0-3.0 (-4.0) µm, elliptic fusiform with slightly rounded apices, nearly bipolarly symmetric but slightly larger in apical portion, hyaline, thin-walled, nonseptate, without visible surface ornamentation, usually lacking conspicuous storage bodies or other inclusions.

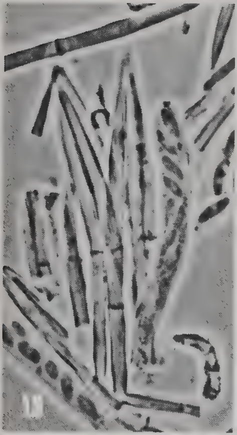
Paraphyses: 2.5-3.5 (-4.0) µm in diam at widest point, exceeding asci by ca 15 µm, distinctly lanceolate with acute apex, 1- or 2-septate, hyaline, thin-walled, unbranched above the base, without conspicuous inclusions or external ornamentation.

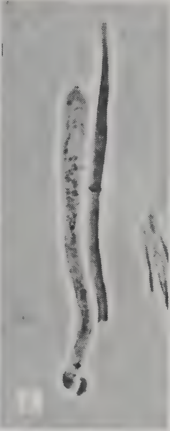
Subhymenium: 10-25 µm thick, of compact, hyaline textura intricata.

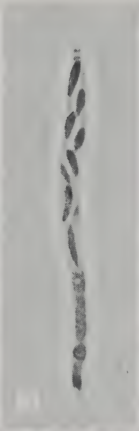
Excipulum: medullary exciple not clearly differentiated from ectal exciple, hyaline, grading to light buff in the outermost cells, grading from thin-walled, composed of textura angularis near the subhymenium to textura oblita near the surface, outermost cell layer giving rise to hairs.

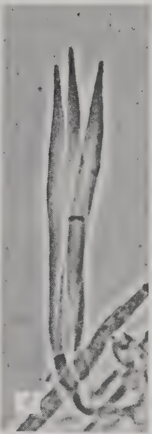
Hairs: 3.0-5.5 × 250 µm, cylindrical with a slightly tapered base and slightly enlarged apex, usually curved away from the substrate, with variable wall thicknesses up to 1 µm, multiseptate with septa which are thinner than outer cell wall, dark brown with light brown apex, with hyaline contents, granulate with brown, round, sessile or short stalked particles up to 0.6 µm in diam, some hairs with hyaline or yellowish masses of refractive matter at the apex. The re-

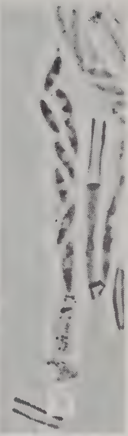
FIGS. 1-14. Microscopic characters of *Dasyscyphus populicola*. FIGS. 1-7, Holotype, 638×. 1, 2. Asci and paraphyses. 3. Ascus. 4. Paraphyses. 5. Mature spores in ascus. 6. Short excipular hairs. 7. Long excipular hairs. FIGS. 8-14, McKnight F6427. 8. Face view of receptacle showing attachment of hairs to ectal exciple, 683×. 9, 10. Excipular hairs, 683×. 11-14. Ascus development, 896×. 11. Very immature ascus. 12. Young ascus with spores cleaved out and pore plug developed. 13. Mature ascus with fully developed spores and pore plug. 14. Ascus after spore discharge through pore.

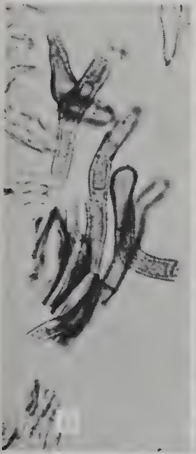








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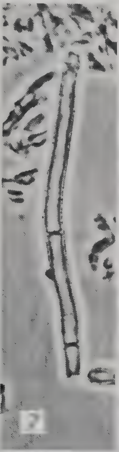
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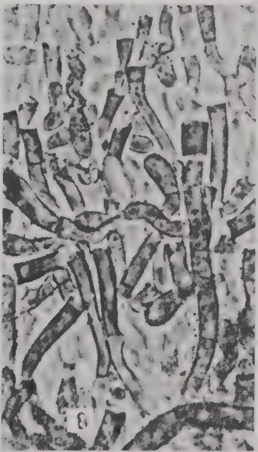
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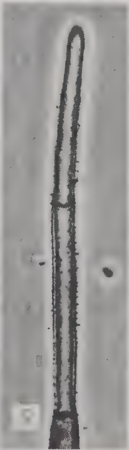
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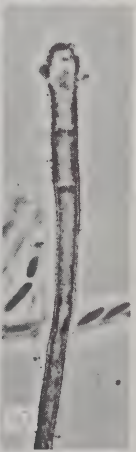

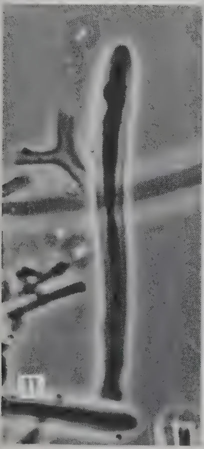
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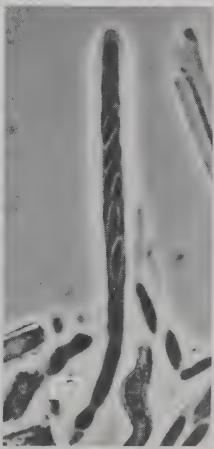

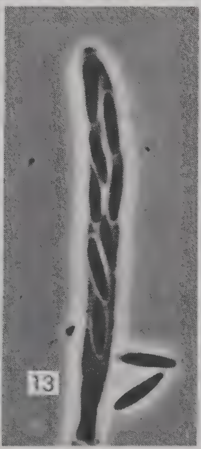
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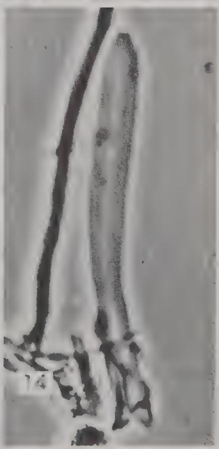
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ceptacle also has numerous, small, brown, clavate 1- or 2-celled hairs interspersed among the longer ones.

Asexual state: not observed.

Habitat: apothecia seated on patches of dark brown hyphae on decorticated, weathered stems of *Populus tremuloides* Michx. and perhaps other hardwoods.

Range and Season: Rocky Mountains and Cascade Range from Arizona to Colorado and central Washington. Fruiting in early spring or in spring-like conditions at higher altitudes.

Type: The collection labelled "*Lachnella populicola* sp. nov." at NY and stamped "type" is presumably the holotype. It was collected in the vicinity of Tolland, Colorado, 8,000-10,000 ft elevation, August 24-26, 1910, by F. J. Seaver and Elsworth Bethel. The label also states "on aspen apparently."

Illustrations: Dennis, 1963. Kew Bull. 17:358, fig. 54.

Specimens examined: ARIZONA: Gilbertson 9380, 28.V.1970, Santa Catalina Mountains, Pima County (BPI). COLORADO: Bethel 25.V.1913, on *Populus tremuloides* (NY); Seaver and Bethel 30.VI.1912, Lake Eldora, on *Populus tremuloides* (NY); Seaver and Bethel 24-26.VIII.1910, holotype, vicinity of Tolland, *Populus tremuloides* (NY). UTAH: McKnight F6427, 14.VI.1964, Mutual Dell, American Fork Canyon, Utah County, on decorticated wood (BRY); McKnight 11752, 26.V.1970, Uintah Mountains, Summit County on decorticated wood (BPI). WASHINGTON: Haines 108, 9.V.1965, Skykomish, King County, on *Populus tremuloides* (NYS); Stuntz 12034, V.1963, near Maltby, King County, on hardwood twigs (WTU); Stuntz 12978, collected by D. Hall, V.1963, near Maltby, King County, on hardwood twigs (WTU). WYOMING: McKnight 10355, 24.VI.1967, West side of Teton Pass, Teton County, on hardwood in and around snowbank (BPI).

Observations: Seaver (1951) did not report the date of the type collection from the vicinity of Tolland, Colorado, but the printed label on the packet gives "August 24-26, 1910." The Colorado collection made three years earlier by Bethel was taken on May 25. This latter collection date agrees more closely with most of the others reported above. These dates suggest a very early fruiting for the fungus. The Uintah Mountains, Utah and Wyoming specimens were found on decorticated wood, presumably aspen, and were fruiting under melting snow. Haines's collection from west central Washington was recorded from *Populus tremuloides*, on May 9. Although later, the Utah County, Utah collection was found in association with another snowbank species, *Guepiniopsis alpinus* (Tracy & Earle) Brasfield. Spring conditions can be found at such high elevations even in late August when the type collection was made. Although records of *D. populicola* are few, the collections reported here indicate a rather wide distribution throughout the Rocky Mountains and Northwest.

Dasyscyphus populicola is recognized by its brown-stalked, crowded apothecia with flat, fully exposed, whitish disc. Its early spring fruiting and blackened but not sunbleached, decorticated *Populus* substrate help distinguish it in the field from *Perrotia populina*. It is distinguished from its closest relative, *D. clandestinus* (Bull. ex Fr.) Fuckel, by being more robust in most of its characters and in the fact that the latter species is restricted to canes of *Rubus*, predominantly in Europe. Another relative, *D. calyculaeformis* (Schum. ex Fr.) Rehm, differs in having a strong pigment release when immersed in 3% KOH, in having slightly larger spores, and by growing on a wide variety of hardwood twigs.

PERROTIA POPULINA (Seaver) Dennis, Kew Bull. 17:358. 1963.

= *Lachnella populina* Seaver, N. Amer. Cup-Fungi (Inoperculates), p. 270. 1951.

(Illustrations: FIGS. 15-29)

Apothecia: superficial, gregarious to crowded, often several hundred together on the substrate which is often greyed by exposure to the elements, centrally stipitate, covered with brown hairs.

Receptacle: subglobose to goblet-shaped, with incurved margin at first, later straight or occasionally recurved, concolorous with disc or more often darker, dull ochraceous brown becoming almost black in old specimens.

Disc: 3.0 mm across, cupulate when young, expanding to deeply concave with steep sides when mature, deeply cupulate or hysteriform when dried, occasionally pitted, *pale yellowisg pink* (Centr. 31) to *strong yellow* (Centr. 84), *light yellowish brown* (Centr. 76), or *dark yellow* (Centr. 88), uniformly colored or darker toward the margin, exposed when mature and sometimes exposed in dried material. (Colors from Kelly & Judd, 1955).

Stipe: 0.5 mm long, 0.3 mm thick, concolorous with receptacle, showing white medulla when broken.

Asci: (55-) 60-80 (-90) × (5.5-) 7-9 (-11) μm, cylindrical with slightly tapered base and hemispherical to truncate apex, lacking a pore or plug, wall 1.5 μm thick, slightly thinner at the apex, no reaction with Melzer's solution, 8-spored, no croziers observed at base.

Ascospores: (7-) 8-13 (-14 × 2.0-3.5 (-4.5) μm, elliptic-fusiform with blunt, rounded apices, slightly curved along the longitudinal axis, nearly bipolarly symmetric but slightly larger in the apical portion, nonseptate, thin- to thick-walled with a central area which appears lighter with phase microscopy, without visible surface ornamentation, biseriate or obliquely biseriate in the ascus.

Paraphyses: 2.5-4.0 μm in diam at the widest point, exceeding the asci by 5-10 μm, filiform to clavate with hemispherical apices, widest at a point level with ascus tips, tapered to a cylindrical base, 1-4-septate, hyaline, thin-walled without conspicuous inclusions or external ornamentation.

Medullary excipulum: hyaline, of highly branched hyphae 1-2 μm diam forming widely spaced textura intricata, not readily distinguished from subhymenium.

Ectal excipulum: hyaline, composed of large-celled textura angularis with distinct walls, with a thin layer of textura porrecta on its inner surface and a layer of brown textura prismatica from which the excipular hairs arise.

Hairs: 3.0-5.0 × up to 200 (-230) μm, cylindrical with slightly enlarged apex and narrowed base, dark brown with pigment in walls, contens hyaline, thin-walled at first but becoming thick-walled with age, unbranched, regularly multiseptate, sparsely or densely covered externally with concolorous short-stalked granules up to 1 μm in diam, arising from periclinal hyphae but forming an acute angle with the surface of the receptacle, curved to conform to the curvature of the receptacle, sometimes with conspicuous yellow to hyaline crystals at the tip; crystals irregular in shape, highly refractive with phase microscopy, forming masses up to 10 μm across short hairs are sometimes interspersed among the longer ones, lighter in color, thinner-walled, covered with capitate granules, straight, unbranched, single-celled or septate, cylindrical, sometimes turning dark blue-green in 3% KOH solution.

Asexual state: not observed.

Habitat: apothecia usually found on gray, weathered, decorticated wood of *Populus tremuloides* Michx., often associated with sterile black hyphae.

Range and Season: Colorado to Utah, Montana and Oregon. Probably throughout the natural range of *Populus tremuloides*, appearing from late summer through early autumn.

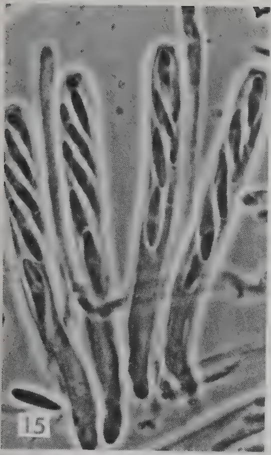
Type: R. W. G. Dennis (1963) designated collection #140 by Seaver and Shope in NY as lectotype, as no holotype was mentioned in the protologue. The packet states, "Univ. of Colo. Camp, on *Populus*, July 22-Sept. 18, 1929."

Illustrations: Dennis, 1963. Kew Bull. 17:359, fig. 55.

Specimens examined: COLORADO: Seaver & Shope #140, Lectotype, 22.VII-18.IX.1929, Tolland, on *Populus tremuloides* Michx. (NY); F. J. Seaver and Elsworth Bethel, 24-26.VIII.1910, Tolland, as *Trichopeziza albolutea* (NY); F. J. Seaver and Paul F. Shope #107, 22.VII-18.IX.1929, Tolland (NY). UTAH: C. T. Rogerson 4096, 2.IX.1971, Cache National Forest, Cache Co., on *Populus tremuloides* (NYS); J. H. Haines #601, 22.VII. 1967, Webster Flat near Cedar City (NYS); K. H. McKnight F1922, 13.VI. 1957, U. S. Forest & Range Experiment Station, Ephriam Canyon, Sanpete Co., on *Populus tremuloides* (BRY); K. H. McKnight F2618, F2680, 31.VII. 1961, U. S. Forest Service Guard Station, Payson Lakes, Utah Co., on *Populus tremuloides* (NY, BPI); K. H. McKnight F2676, 2.VIII.1961, Moon Lake, Duchesne Co., on *Populus tremuloides* (BRY). WYOMING: A. H. Smith #35027, 12.VIII.1950, Medicine Bow Mountains, Carbon Co. (MICH).

Observations: *Perrotia populina* may be distinguished in the field by its late fruiting time and gray, weathered, decorticated, aspen substrate. It differs from *P. flammea* (Alb & Schw. ex Fr.) Boud., on similar substrate, in having orange to brown hairs whereas the hairs of *P. flammea* are rust red. Microscopically *P. populina* is distinctive in having no pore plug or other apparent apical apparatus, nonlanceolate paraphyses, and no color change in 3% KOH. The absence of a pore plug is a rare character in the Helotiales. It occurs in *P. flammea*, the type species of *Perrotia*, and in some species of *Lachnellula* including all of those with colored hairs such as *L. arida* (Phill.) Dennis. The lack of an ascal pore is evidence which suggests not only that *P. populina* is appropriately placed in *Perrotia*, but that *Perrotia* is related to

FIGS. 15-28. Microscopic characters of *Perrotia populina*. FIGS. 15-19, Lectotype, 683×. 15. Asci and paraphyses. 16. Paraphysis. 17. Medullar exciple. 18. Hair. 19. Hair with crystal mass at tip. 20. McKnight F2618, 683×. Surface view of receptacle showing attachment of hairs to ectal exciple. FIGS. 21-28. McKnight F2618, 896×. 21. Spores. 22-28. Developmental states of asci showing tearing of ascus tip.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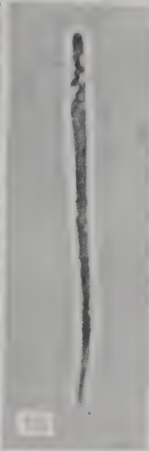
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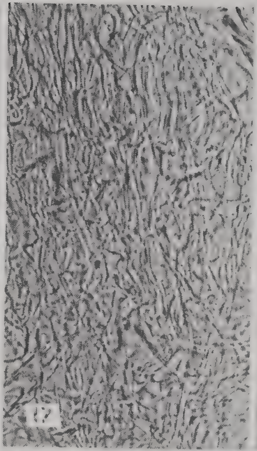
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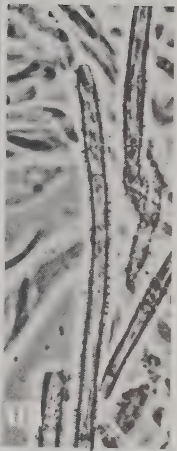
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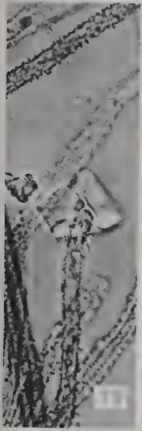
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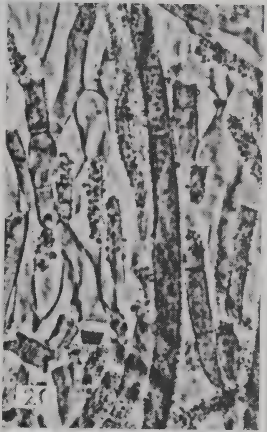
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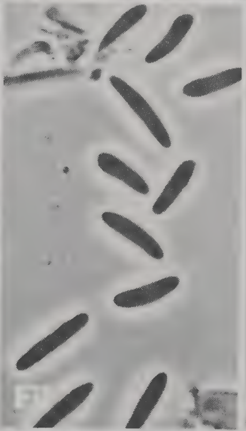
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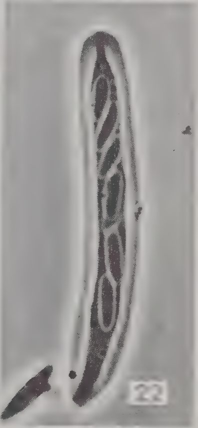
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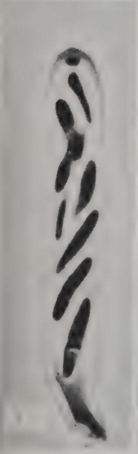
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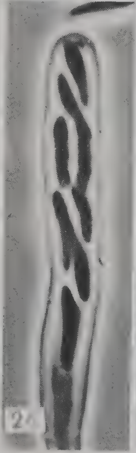
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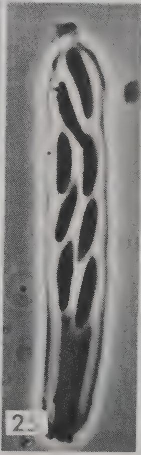
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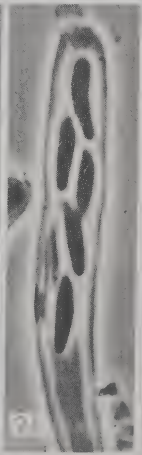
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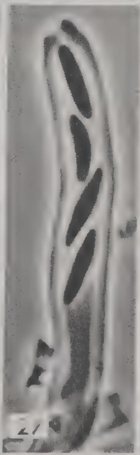
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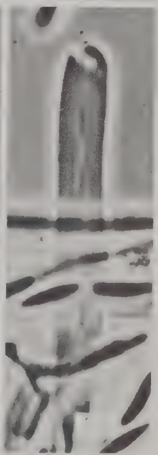
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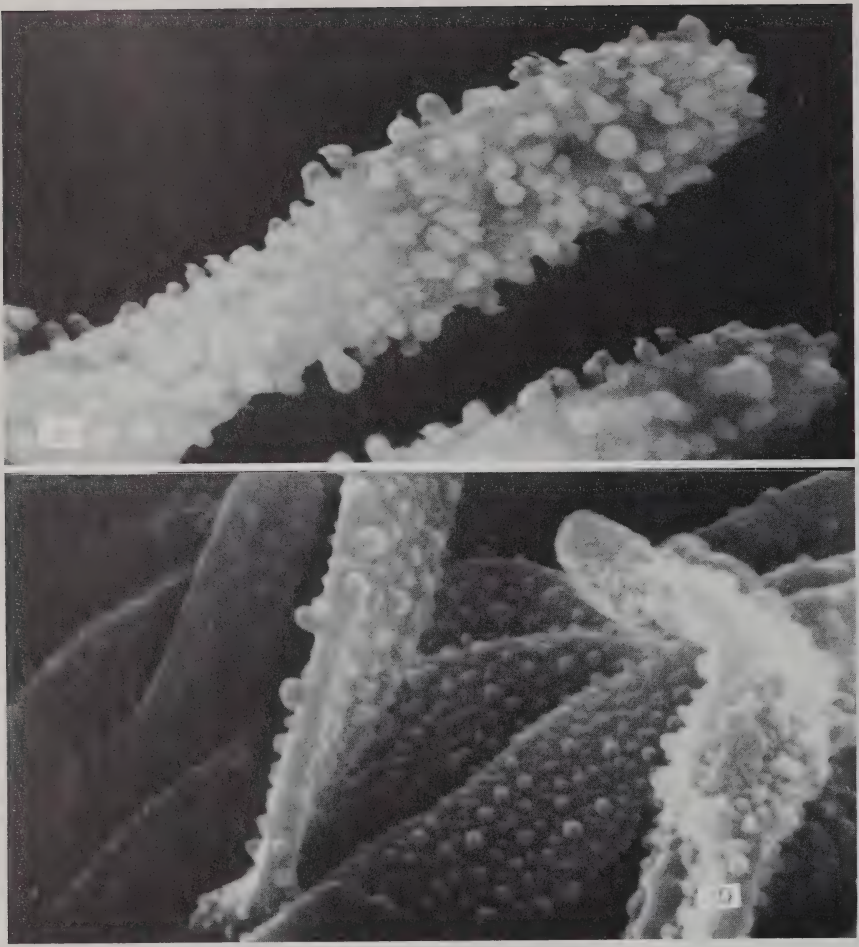

FIGS. 29-30. Scanning electron micrographs of excipular hairs. 29. *Perrotia populina*, lectotype, ca 5700×. 30. *Dasyscyphus populicola*, type, ca 6300×.

Lachnellula in the Hyaloscyphaceae subfamily Trichoscyphelloideae as suggested by Dennis (1962).

GENERAL DISCUSSION

The two species described above are examples of Hyaloscyphaceous fungi adapted to different environmental situations *Dasyscyphus populicola* is typical of tribe Lachneae in being adapted to moist conditions of early spring and melting snow Its lanceolate paraphyses and flexible exciple act as a hygroscopic mechanism which exposes the disc when moist and covers it when dry. It has a pore plug mechanism which enables the spores to be shot from the apothecia when the disc is exposed (FIGS. 11-14), and thin-walled spores and asci which offer minimal protection from desiccation and irradiation. *Perrotia populina* on the other hand is typical of the subfamily Trichoscyphelloideae in being adapted to dry, exposed conditions. Its paraphyses are narrower and do not expand as greatly as those of the previous species. Its hygroscopic mechanism is not as efficient. It has thicker ascus and spore walls, but no visible pore plug or operculum. The spores are discharged by a tear in the hemispherical ascus tip (FIGS. 22-28). More observation of fresh material is necessary to determine what environmental conditions trigger spore release and how this differs from those Hyaloscyphaceae with pore plugs.

We gratefully acknowledge the loan of Seaver's type specimens from the Cryptogamic Herbarium of the New York Botanical Garden (NY), and the thorough review of the manuscript by Donald Pfister of the Farlow Herbarium.

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NEW SPECIES IN THE LICHEN GENUS *PARMOTREMA* MASS.

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SUMMARY

The following eleven new species of *Parmotrema* Mass. are described: *P. concurrens* Hale, *P. conferendum* Hale, *P. enteroxanthum* Hale, *P. expansum* Hale, *P. indicum* Hale, *P. lopezii* Hale, *P. neotropicum* Kurokawa, *P. progenes* Hale, *P. reitzii* Hale, *P. subcompositum* Hale, and *P. vartakii* Hale. New combinations are made as follows: *Parmotrema balense* (Winn.) Hale, *P. neolobulascens* (Winn.) Hale, *P. pseudonilgherrense* (Asah.) Hale, *P. subsumptum* (Nyl.) Hale, and *P. yodae* (Kurok.) Hale.

1. *PARMOTREMA CONCURRENS* Hale, sp. nov.

Thallus saxicola, adnatus vel fere adpressus, cinereo-albidus, 5-8 cm latus, lobis rotundatis, congestis, 5-10 mm latis, margine ciliatis, ciliis ca. 1 mm longis, superficie et pro parte margine isidiatis, isidiis simplicibus, crassis 0.1-0.15 X 0.2-0.3 mm, basi rumpentibus; superne opacus, emaculatus, planus, aetate fissus, hyphis fungorum nigris obtectus; cortex superior epicorticatus, 15 µm crassus, stratum gonidiale 15 µm crassum, medulla alba, ca. 100 µm crassa, cortex inferior 9-11 µm crassus; subtus niger, sparse rhizinosus, ambitu nudus, castaneus. Apothecia non visa.

Chemistry: Atranorin, salazinic acid, and gyrophoric acid.

Holotype: Brique, Pernambuco, Brazil, *L. Xavier Filho* 752, May 1970 (US) (Figure 1).

Additional specimens examined. Brazil: Goiana, Pernambuco, *Xavier* 764 (US); Caruaru, Pernambuco, *Epaminondas* 11656, 11658 (US).

Aside from the unusual combination of acids, this species is characterized by the simple, stumpy isidia and the saxicolous habit. It could be related to the African endemic *Parmotrema pseudocrinitum* (Abb.) Hale, which contains only gyrophoric acid but which is larger and more loosely adnate. It is part of the species complex which I had identified as "Parmelia subcrinita" in my monograph of *Parmelia* subgenus *Amphigymnia* (Hale, 1965). With the introduction of thin-layer chromatography the chemistry and taxonomy of this complex have finally been resolved. Most of the specimens with a black lower surface and isidia have proved to be *P. ultralucens* (Krog) Hale (Krog, 1974), a large, loosely attached species with salazinic acid and lichexanthone in the medulla. Other specimens containing only salazinic acid have been re-identified as *P. subisidiosum* (Müll. Arg.) Hale, which has a strongly reticulately maculate to cracked cortex. The few remaining specimens found to contain salazinic acid with gyrophoric acid are described here as new. The species has been collected so far only in the state of Pernambuco in Brazil.

2. *PARMOTREMA CONFERENDUM* Hale, sp. nov.

Thallus corticola vel saxicola, laxe adnatus, membraneus, pallide viridi- vel stramineo-cinereus, 8-12 cm latus, lobis rotundatis latisque, 5-12 mm latis, margine ciliatis sorediatisque, ciliis modicis, usque ad 2 mm longis, soraliis linearibus vel aetate irregularibus et submarginalibus; superne planus, nitidus, valde albo-maculatus, aetate rimosus; cortex superior epicorticatus, 8-11 µm crassus, stratum gonidiale 10-15 µm crassum, medulla alba, 80-110 µm crassa, cortex inferior 9-10 µm crassus; subtus pallide castaneus vel centro nigricascens, dense rhizinosus, rhizinis brevibus, ad marginem obsitis. Apothecia non visa.

Chemistry: Atranorin and norlobaridone.

Holotype: On rocks along stream, El Valle, Estado Mérida, Venezuela, elevation 2600 m, *M. E. Hale* 43291, 8 Feb. 1974 (US) (Figure 2).

Additional specimens examined. United States: Mason Co., Texas, *Whitehouse* 25201a (US). Venezuela: San Jacinto, Estado Mérida, *Hale & López* 42276 (MERF, US); Rubio, Estado Táchira, *Hale & López* 45720 (MERF, US). Argentina: Horco Molle, Tucumán, *Culberson* 14910 (DUKE, US).

Parmotrema conferendum is part of the *P. recipiendum* (Nyl.) Hale complex, a group of species that are uniformly brown below, rhizinate to the margin, and white maculate above. The other sorediate species include *P. subsumptum* (Nyl.) Hale (comb. nov. Basionym: *Parmelia subsumpta* Nyl. Flora 52:117. 1869) (salazinic acid only) and *P. reitzii* Hale (see below) (salazinic acid and norlobaridone), parallel to the isidiate series related to *P. neotropicum* Kurok. (see below). This is a rare species compared with the pantropical *P. subsumptum*, but it has been reported in Ethiopia by Winnem (1975).

3. *PARMOTREMA ENTEROXANTHUM* Hale, sp. nov.

Thallus saxicola, laxe adnatus, fragilis, cinereo-albidus, usque ad 15 cm latus, lobis latis, subcongestis, 6-10 mm latis, eciliatis vel sparsissime ciliatis, submargine lobulato-dissectis, superficie isidiatis, isidiis incrassatis, pustulato-inflatis, dactyloideo-ramosis, usque ad 1 mm altis, aetate rumpentibus et subsorediatis; superne planus, opacus, emaculatus, primum continuus deinque rimosus, cortice fragili; cortex superior epicorticatus, columnari-paliformis, 15-18 µm crassus, stratum gonidiale 10-15 µm crassum, medulla pro parte alba vel flavida, sub pustulis intense crocea, 150-170 µm crassa, cortex inferior 15-16 µm crassus; subtus niger, modice rhizinosus, ambitu nudus, castaneus. Apothecia numerosa, subpedicellata, 4-10 mm diametro, amphithecio subdenticulato, ruguloso, disco imperforato; hymenium 130-140 µm altum; sporae 4-8, 16-18 X 28-30 µm, episporio 2.5 µm crasso.

Chemistry: Atranorin, salazinic acid, and unidentified pigments.

Holotype: On rocks in open pasture, La Carbonera, Estado Mérida, Venezuela, elevation 2100 m, *M. Hale and M. López-Figueiras* 44177 (US; isotypes in MERF, UPS) (Figure 3).

Additional specimens examined. Venezuela: La Carbonera, Estado Mérida, *Hale & López* 44163; Pico Banderas, Estado Táchira, *Hale & López* 45393 (MERF, US).

This unusual species has no close affinities with any other *Parmotremata*. The dactyloid, inflated isidia are large and become dense with age. The medullary pigments probably include entothein, but other species with these pigments (Hale, 1974) usually contain gyrophoric acid or rarely protocetraric acid (*P. lopezii* below). It occurs on rocks in open pastures and other disturbed areas at about 2000 m elevation and probably represents an Andean endemic.

4. *PARMOTREMA EXPANSUM* Hale, sp. nov.

Thallus saxicola vel corticola, laxe adnatus, subfragilis, cinereo-albidus vel aetate in herbario stramineo-albidus, 10-20 cm latus, lobis rotundatis, subimbricatis, 6-10 mm latis, centrum versus parce dissectis vel breve laciniatis, margine modice ciliatis, ciliis 0.5-1.0 mm longis, subcrassis, simplicibus vel furcatis, isidiis sorediisque destitutus; superne laevis, opacus, albo-reticulatus, aetate reticulatim rimosus; cortex superior epicorticatus, 15-16 µm crassus, stratum gonidiale 15 µm crassum, medulla alba, 120-150 µm crassa, cortex inferior 15-17 µm crassus; subtus niger, modice rhizinosus, margine anguste nudus, castaneus. Apothecia numerosa, adnata vel subpedicellata, 4-7 mm diametro, eciliata, disco imperforato; hymenium 60-70 µm altum; sporae 8, 9 X 16-18 µm; pycnidiosporae 0.5 X 6-7 µm.

Chemistry: Atranorin and salazinic acid.

Holotype: On rocks, Patarra, Province of San José, Costa Rica, elevation 1300 m, *M. Guiros* 1462, 4 July 1948 (US; isotype in UPS) (Figure 4).

Additional specimens examined. Costa Rica: San José, *Valerio* s. n. (US). Panama: Volcán Chiriquí, *Hale* 38843, 38917, 38919, *Scholander* s. n. (US). Brazil: Serra de Caldas, Minas Gerais, *Mosén* 2316 (S, US).

This species is obviously closely related to *Parmotrema cetratum* (Ach.) Hale, which also has salazinic acid but a much more conspicuously reticulate-cracked cortex and perforate apothecia. *Parmotrema expansum* has generally narrow lobes and a distinct brown bare zone below at the margins; it never becomes laciniate as *P. cetratum* does. It has been collected only in Central America except for a tentively identified specimen from Brazil.

5. *PARMOTREMA INDICUM* Hale, sp. nov.

Thallus corticola vel (ut typus) saxicola, laxe adnatus, paulo coriaceus, viridi- vel albo-cinereus, 8-20 cm latus, lobis rotundatis, 8-16 mm latis, margine ciliatis sorediatisque, ciliis sparsis vel modicis, usque ad 2 mm longis, soraliis linearibus, aetate submarginalibus et orbicularibus; superne opacus, emaculatus, continuus vel aetate rimosus; cortex superior epicorticatus, 11-13 µm crassus, stratum gonidiale 15-18 µm crassum, medulla alba, 100-130 µm crassa, cortex inferior 15 µm crassus; subtus niger et modice rhizinosus ad centrum, obscure castaneus nudusque marginem versus. Apothecia non visa.

Chemistry: Atranorin, gyrophoric acid, and norlobaridone.

Holotype: On rocks in stream, forest below Silver Cascade, Kodaikanal, Tamil Nadu, India, elevation 1800 m, *M. E. Hale and P. G. Patwardhan* 43874 (US; isotype in UPS) (Figure 5).

Additional specimens exxmined. India: Devicolum, Kerala, *Hale* 47595, 47596 (US); Thekkadi, Kerala, *Hale* 46579 (US); Oothu, Tamil Nadu, *Hale* 43666 (US).

This species is closely related to the pantropical *Parmotrema sancti-angelii* (Lynge) Hale (gyrophoric acid present), on the one hand, and to the rare Asian species *P. yodae* (Kurokawa) Hale (comb. nov. Basionym: *Parmelia yodae* Kurokawa, Jour. Coll. Arts Sci. Chiba Univ. 5(1):97. 1967) (norlobaridone present), on the other. This combination of the two acids is also known in *Parmotrema balense* (Winn.) Hale (comb. nov. Basionym: *Parmelia balensis* Winn. Norw. Jour. Bot. 22:151. 1975), an African species with heavy, almost effigurate white maculation and a very coriaceous thallus. The soralia of *P. indicum* are usually typically linear and powdery but with age may become submarginal as well with development of coarsely pustulate-sorediate patches. The species is known so far only from the Western Ghats region in India.

6. *PARMOTREMA LOPEZII* Hale, sp. nov.

Thallus corticola, laxe adnatus, coriaceus, pallide viridi-flavicans, 10-15 cm latus, lobis rotundatis latisque, usque ad 20 mm latis, margine integris, raro sparse ciliatis, sorediis isidiisque destitutus; superne planus, continuus, opacus, emaculatus; cortex superior epicorticatus, 9-10 µm crassus, stratum gonidiale 10-15 µm crassum, medulla pallide flava vel aetate fere crocea, 140-160 µm crassa, cortex inferior 16-18 µm crassus; subtus niger et sparse rhizinosus ad centrum, castaneus nudusque marginem versus. Apothecia subpedicellata, eciliata, usque ad 15 mm diametro, imperforata; hymenium 70-80 µm altum; sporae (sec. spec. *Hale* 45200a) 8, 12-13 X 25-27 µm, episporio 2.5 µm crasso.

Chemistry: Atranorin, usnic acid, protocetraric acid, and unidentified pigments (including entothein).

Holotype: El Cobre Chiquito, Páramo de Tamá, Estado Táchira, Venezuela, elevation 2700 m, *M. López-Figueiras* 45564, 28 March 1975 (US; isotype in MERF) (Figure 6).

Additional specimens examined. Venezuela: La Carbonera, Estado Mérida, *Hale & López* 42016, 42017a; Betania, Estado Táchira, *Hale & López* 45200a (US).

This conspicuous lichen is characterized by the large, pale yellowish green, leathery thallus and the pale yellow to orange medulla. There is only one other species with a pigmented medulla and protocetraric acid, *P. cristatum* (Nyl.) Hale, which differs in having dentate-ciliate apothecia and a strongly yellow medulla (Hale, 1974). *Parmotrema lopezii* occurs on trees in open forests at 2000-2700 m and appears to be restricted to the Andean region.

7. *PARMOTREMA NEOTROPICUM* Kurokawa, sp. nov.

Thallus corticola, adnatus vel laxe adnatus, pallide stramineo-viridis vel cinereo-albidus, 6-9 cm latus, lobis rotundatis, 8-14 mm latis, margine ciliatis, ciliis modicis vel sparsis, ca. 1 mm longis; superne planus, nitidus, albo-maculatus, aetate irregulariter reticulatim rimosus, isidiatus, isidiis simplicibus vel parce ramosis, cylindricis, 0.1 X 0.3-0.6 mm, aetate crebris; cortex superior epicorticatus, 11-14 µm crassus, stratum gonidiale 15-18 µm crassum, medulla alba, 130-160 µm crassa, cortex inferior incoloratus, 15-18 µm crassus; subtus pallide castaneus vel centro nigricascens, rhizinosus, rhizinis brevibus, crebris, usque ad marginem obtectis. Apothecia non visa.

Chemistry: Atranorin, often traces of usnic acid (as in the holotype), and salazinic acid.

Holotype: On conifers, km. 1145 on highway 190, west of San Cristóbal, Chiapas, Mexico, elevation 2120 m, *M. E. Hale* 20190, 25 March 1960 (US) (Figure 7).

Additional specimens examined. United States: Rockingham Co., North Carolina, *Hale* 16381 (US); DeKalb Co., Alabama, *Sierk* 1018 (US); Seminole Co., Florida, *Rapp* s. n. (FLAS, US). Cuba: Sierra Maestra, Oriente, *Imshaug* 24798 (MSC, US). Mexico: Veracruz, *Hale* 19859 (US); Chiapas, *Hale* 20013, 21141, 20230, 20267, 20614, 21205 (US).

This is an isidiate member of the *Parmotrema recipiendum* (Nyl.) Hale group, representing the chemical population with salazinic acid alone in the medulla. Externally it is indistinguishable from the other isidiate members, *P. haitiense* (Hale) Hale (norlobaridone) and *P. subtinctorium* (Zahlbr.) Hale (salazinic acid and norlobaridone). It has a rather restricted range from southern United States into Cuba and Mexico.

8. *PARMOTREMA PROGENES* Hale, sp. nov.

Thallus corticola, laxe adnatus, coriaceus, albidocinerascens, 7-10 cm latus, lobis latis rotundatisque, subimbricatis, 6-10 mm latis, margine sparse ciliatis, isidiis et sorediis destitutus; superne planus vel rugulosus, opacus, emaculatus; cortex superior epicorticatus, 12-14 µm crassus, stratum gonidiale 10-15 µm crassum, medulla alba, ca. 150 µm crassa, cortex inferior 12-14 µm crassus; subtus niger, modice rhizinosus, marginem versus nudus, castaneus. Apothecia numerosa, adnata, usque ad 11 mm diametro, eciliata, disco imperforato; hymenium 100 µm altum; sporae 8, 10 X 20-22 µm, episporio 2.5 µm crasso; pycnidiosporae 0.5 X 4-5 µm.

Chemistry: Atranorin, protocetraric acid, echinocarpic acid, and associated unknown substances.

Holotype: Santarem, Brazil, *Spruce* 113 (BM; isotype in US) (Figure 8).

Additional specimens examined. Peru: Tingo Maria, San Martín, *Allard* 21644 (US).

This species would probably be identified as *Parmotrema zollingeri* (Hepp) Hale without a chemical test, although it is somewhat smaller and more adnate. It represents the fertile parent morph of *P. dilatatum* (Vain.) Hale, which has the same chemistry but is sorediate. I recently found that many specimens which I had called "Parmelia dilatata" (see Hale, 1965:245) contain only protocetraric acid in the medulla and produce mostly linear, marginal soralia on the main lobes; these can be identified as *Parmotrema robustum* (Degel.) Hale, a pantropical species. The remaining specimens, which occur almost exclusively in the New World and tend to be more laciniate with soralia produced on short marginal laciniae, represent the typical population of *P. dilatatum.*

9. *PARMOTREMA REITZII* Hale, sp. nov.

Thallus corticola, laxe adnatus, pallide stramineoviridis, 10-15 cm latus, lobis rotundatis, parum lobatis, 7-10 mm latis, margine ciliatis sorediatisque, ciliis brevibus, 0.3-0.8 mm longis, soraliis marginalibus, linearibus; superne laevis, nitidus, valde albo-maculatus, cortice continuo vel aetate fisso; cortex superior epicorticatus, 10-15 µm crassus, stratum gonidiale 10-15 µm crassum, medulla alba, 100-140 µm crassa, cortex inferior castaneus vel incoloratus, 8-10 µm crassus; subtus pallidus vel aetate nonnihil nigricascens centrum versus, dense rhizinosus, rhizinis brevibus, fere usque ad marginem obtectis. Apothecia non visa.

Chemistry: Atranorin, salazinic acid, and norlobaridone.

Holotype: Lajes, Santa Catarina, Brazil, elevation 950 m, *Reitz and Klein* 12927 (US) (Figure 9).

Additional specimens examined. Brazil: Passo do Socorro, Santa Catarina, *Reitz & Klein* 15573 (US). Venezuela: Páramo de Tamá, Estado Táchira, *Hale & López* 45099 (US, MERF).

Parmotrema reitzii appears to be a "hybrid" species in the *P. recipiendum* group, coordinate with *P. subsumptum* (salazinic acid) and *P. conferendum* (norlobaridone), as explained above in the discussion of *P. conferendum*. This species occurs so far only in South America at mid elevations.

10. *PARMOTREMA SUBCOMPOSITUM* Hale, sp. nov.

Thallus corticola, laxe adnatus, coriaceus, cinereoalbus, ca. 10 cm diametro, lobis latis, rotundatis, usque ad 15 mm latis, margine ciliatis, ciliis saepe densis, 1-3 mm longis, margine et submargine sorediatis, soraliis linearibus; superne nitidus, continuus, valde albo-maculatus vel fere effiguratus; cortex superior epicorticatus, 14-15 µm crassus, stratum gonidiale 18 µm crassum, medulla alba, 90-120 µm crassa, cortex inferior 16-17 µm crassus; subtus niger, sparse rhizinosus, marginem versus late nudus, castaneus. Apothecia non visa (vel raro evoluta in Ethiopia, sporis non visis).

Chemistry: Atranorin, gyrophoric acid, and norstictic acid (norstictic acid lacking in some populations).

Holotype: West slope of Mt. Kilimanjaro, east of Lemosho Glades, Kilimanjaro Province, Tanzania, elevation 2500-2800 m, *R. Santesson* 21262, 14 Jan. 1970 (UPS) (Figure 10).

Additional specimens examined. Same locality as the holotype, *Santesson* 21263a (UPS). A number of records from Ethiopia are given by Winnem (1975:162) but I have not examined these.

This species is the sorediate morph of *Parmotrema compositum* (Hale) Hale, which has approximately the same range and habitat. According to Winnem (1975:162), it is common in the *Erica* zone (2700-3600 m) in Ethiopia. She also reports a population lacking norstictic acid which could be confused with *P. neolobulascens* (Winn.) Hale (comb. nov. Basionym: *Parmelia neolobulascens* Winn., Norw. Jour. Bot. 22:157. 1975), a more coriaceous, sparsely ciliate, and consistently sublaminally sorediate species.

Parmotrema subcompositum is part of a unique group of species concentrated mainly in Africa. All are heavily white maculate to effigurate maculate and leathery and occur at high elevations. The chemistry of the group indicates long isolation with "hybridization" between populations containing gyrophoric acid, norstictic acid, alectoronic acid, or norlobaridone in various combinations. For example, *P. compositum* and *P. subcompositum* contain gyrophoric acid with or without norstictic acid, *P. neolobulascens* gyrophoric acid, *P. diversum* (Hale) Hale and *P. lobulascens* (Stein. & Zahlbr.) gyrophoric acid and alectoronic acid, *P. balense, P. spilotum* (Hale) Hale, and *P. subschimperi* (Hale) Hale norstictic acid and norlobaridone, and *P. nilgherrense* (Nyl.) Hale and *P. pseudonilgherrense* (Asah.) Hale (comb. nov. Basionym: *Parmelia pseudonilgherrensis* Asah., Jour. Jap. Bot. 29:370. 1954) alectoronic acid. All of the species in this group are either sorediate or nonsorediate; none have isidia.

11. *PARMOTREMA VARTAKII* Hale, sp. nov.

Thallus corticola, laxe adnatus vel suberectus, pallide viridi-vel albido-cinereus, 5-8 cm latus, lobis rotundatis, parce dentatis, 4-8 mm latis, margine ciliatis, ciliis numerosis, 0.4-0.9 mm longis, simplicibus, isidiis sorediisque destitutus; superne planus vel rugulosus, opacus, emaculatus vel paulo albo-maculatus, pycnidiis numerosis; cortex superior epicorticatus, 14-16 µm crassus, stratum gonidiale 15 µm crassum, medulla alba, 130-150 µm crassa, cortex inferior 12-13 µm crassus; subtus niger et sparse rhizinosus ad centrum, ambitu late nudus, stramineus vel albidus. Apothecia numerosa, substipitata, eciliata, usque ad 10 mm diametro, amphithecio rugoso, valde albo-maculato, disco imperforato; hymenium 60-65 µm altum; sporae 8, 8-10 X 16-18 µm; pycnidiosporae 0.5 X 8-9 µm.

Chemistry: Atranorin, α-collatolic acid, and traces of alectoronic acid.

Holotype: Thorn forest, Bandipur, along the Mysore-Ooty road, Karnataka, India, elevation 1400 m, *M. E. Hale and P. G. Patwardhan* 46454, 20 Jan. 1976 (US) (Figure 11).

Additional specimens examined. India: Bandipur, Karnataka, *Hale* 46442, 46450, 46476 (US), *Vartak* s. n. (Poona).

This apparently highly endemic species is characterized by the imperforate, eciliate apothecia, short cilia, and the predominance of α-collatolic acid. It is more usual to have equal or greater concentration of alectoronic acid. The white rim below suggests relationship with *Parmotrema wainii* (A. L. Sm.) Hale, which has long marginal cilia and ciliate apothecia, *P. subrugatum* (Kremp.) Hale, which has large, dentate-ciliate apothecia and large spores, and *P. rigidum* (Lynge) Hale, a New World species with eciliate but strongly perforate apothecia. It is also externally very similar to *P. abessinicum* (Kremp.) Hale, a pantropical species with norlobaridone. The species is named in honor of Dr. V. D. Vartak of the Maharashtra Association for the Cultivation of Science, who first discovered it.

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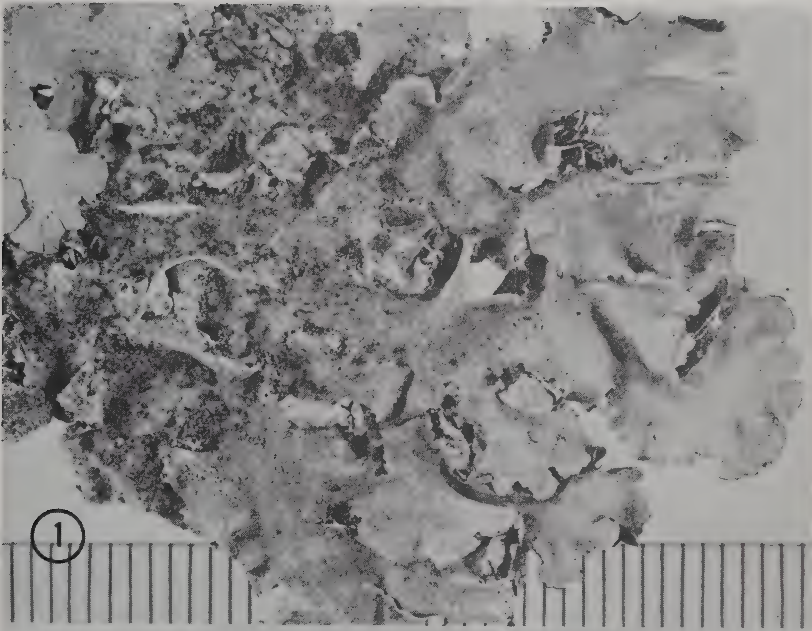
Explanation of Figures

Figure 1: *Parmotrema concurrens* (*Xavier* 752 in US). Figure 2: *P. conferendum* (*Hale* 43291 in US). Figure 3: *P. enteroxanthum* (*Hale & Lopez* 44177 in US). Figure 4: *P. expansum* (*Guiros* 1462 in US). Figure 5: *P. indicum* (*Hale & Patwardhan* 43874 in US). Figure 6: *P. lopezii* (*Lopez* 45564 in US). Figure 7: *P. neotropicum* (*Hale* 20190 in US). Figure 8: *P. progenes* (*Spruce* 113 in US). Figure 9: *P. reitzii* (*Reitz & Klein* 12927 in US). Figure 10: *P. subcompositum* (*Santesson* 21262 in UPS). Figure 11: *P. vartakii* (*Hale & Patwardhan* 46454). Scale in mm for all figures.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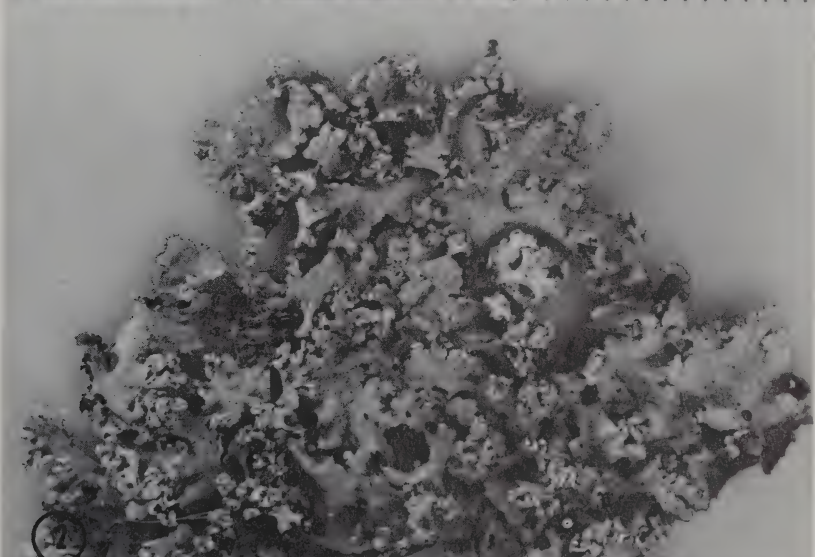
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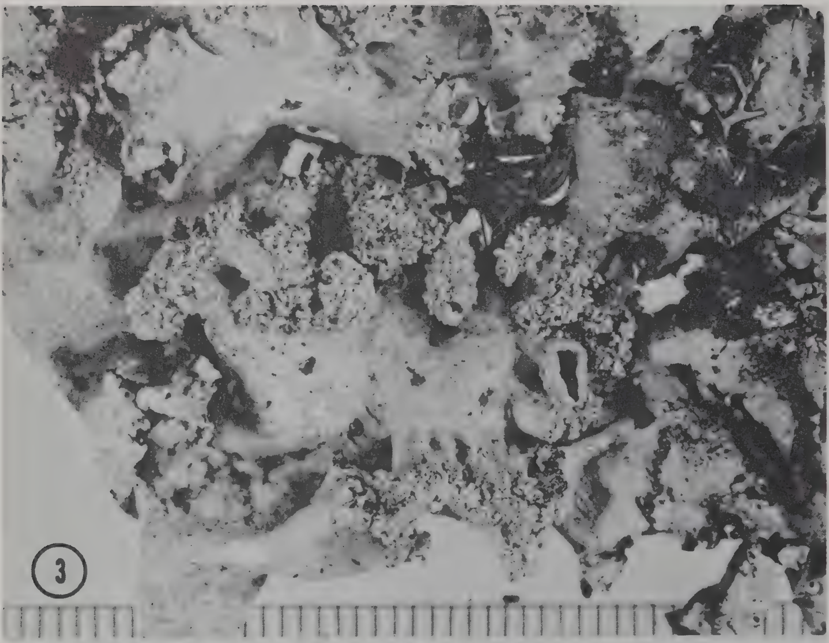

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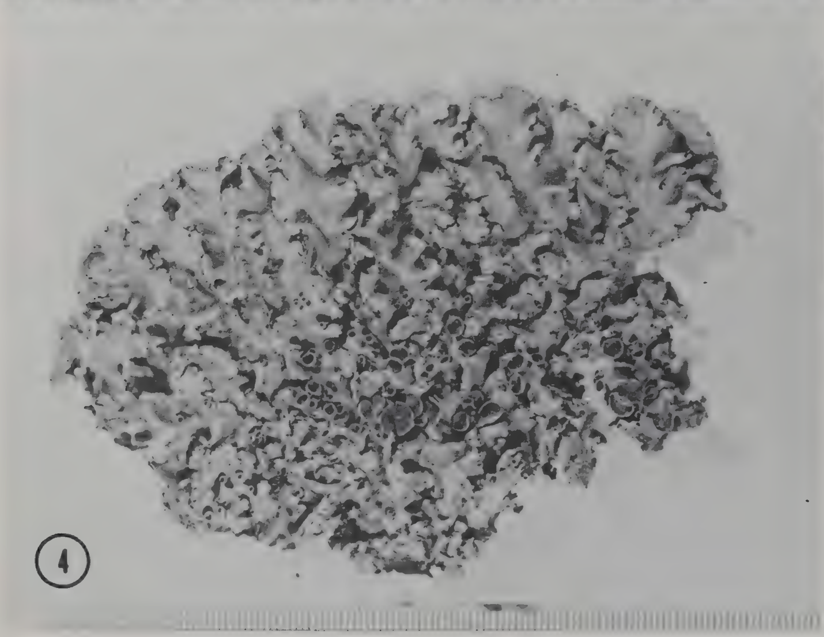

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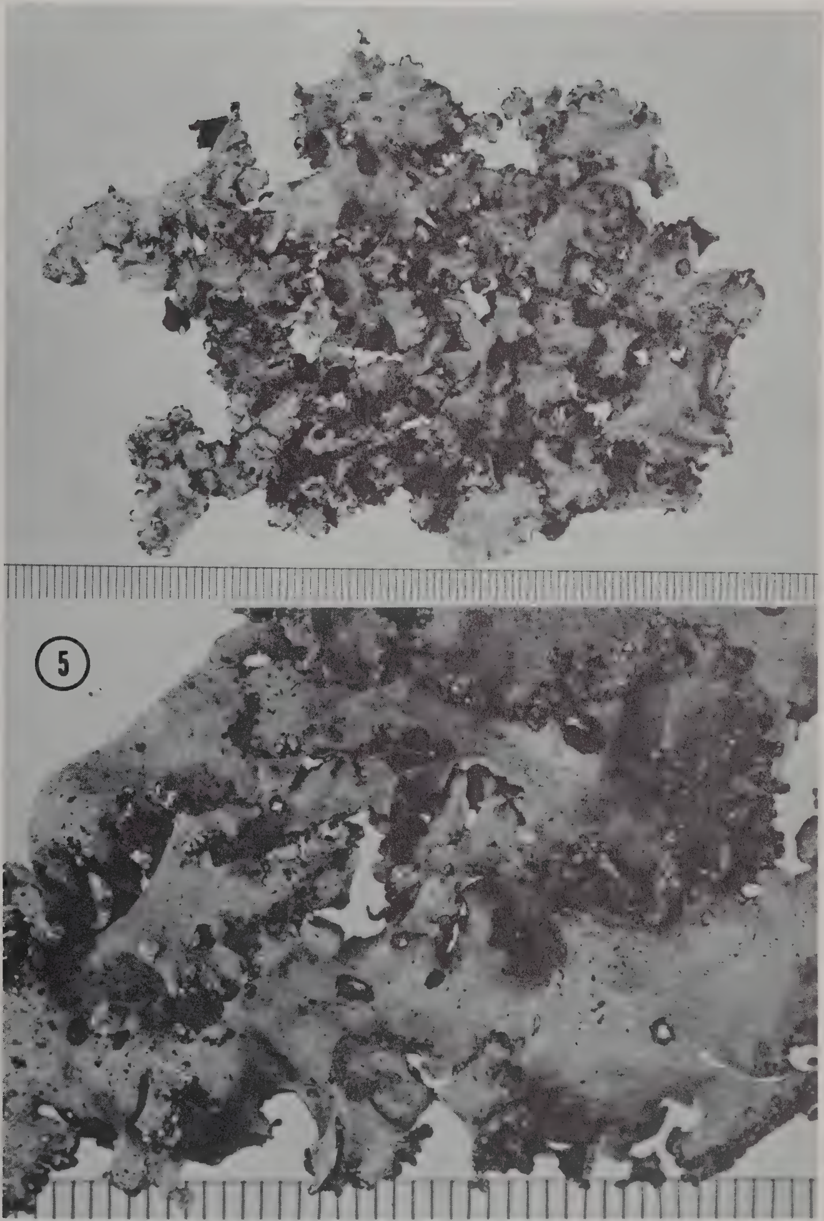

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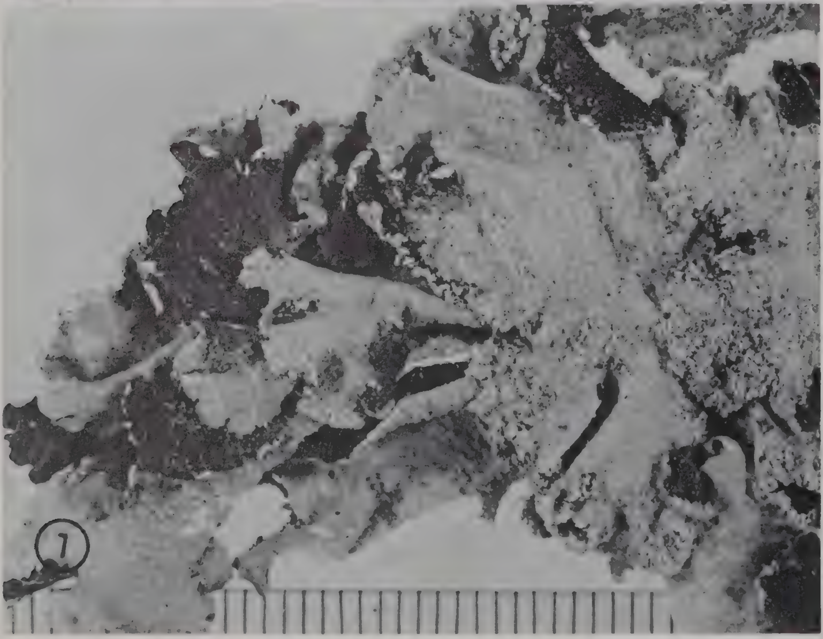

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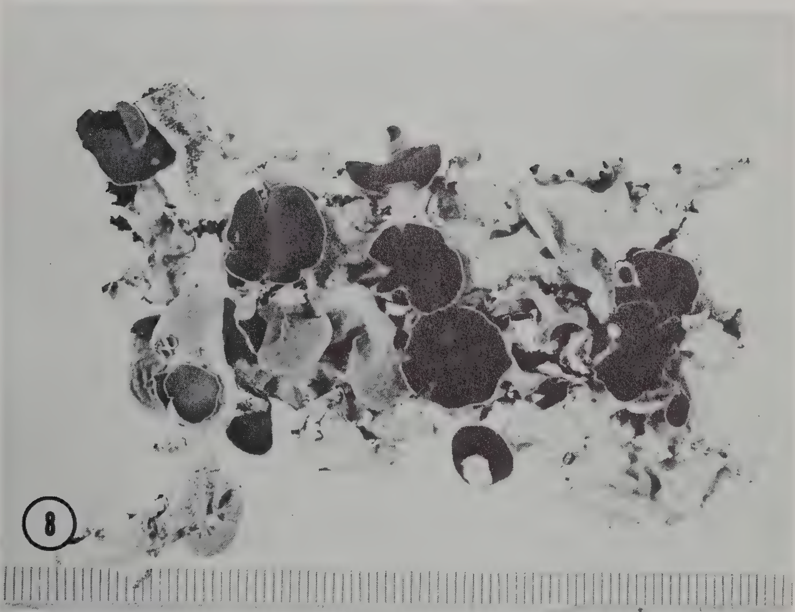

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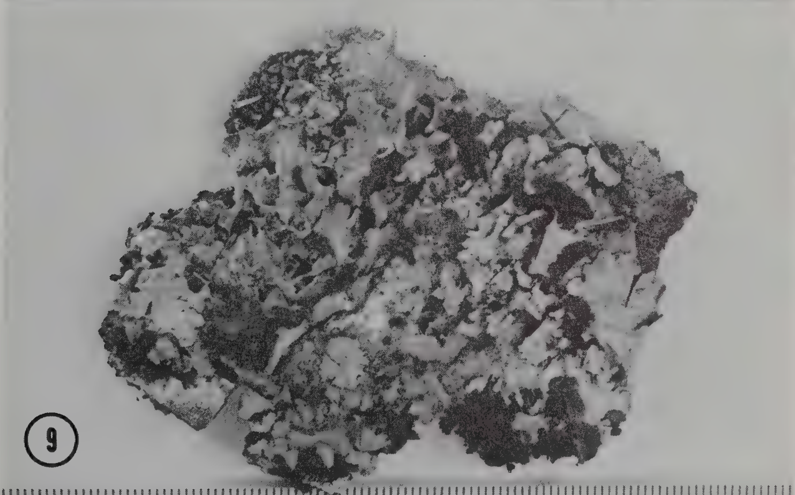

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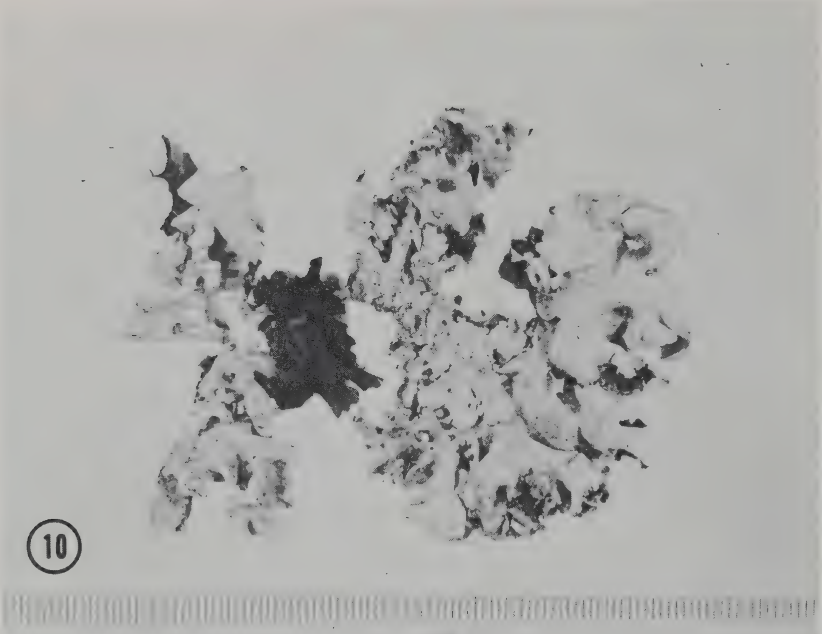

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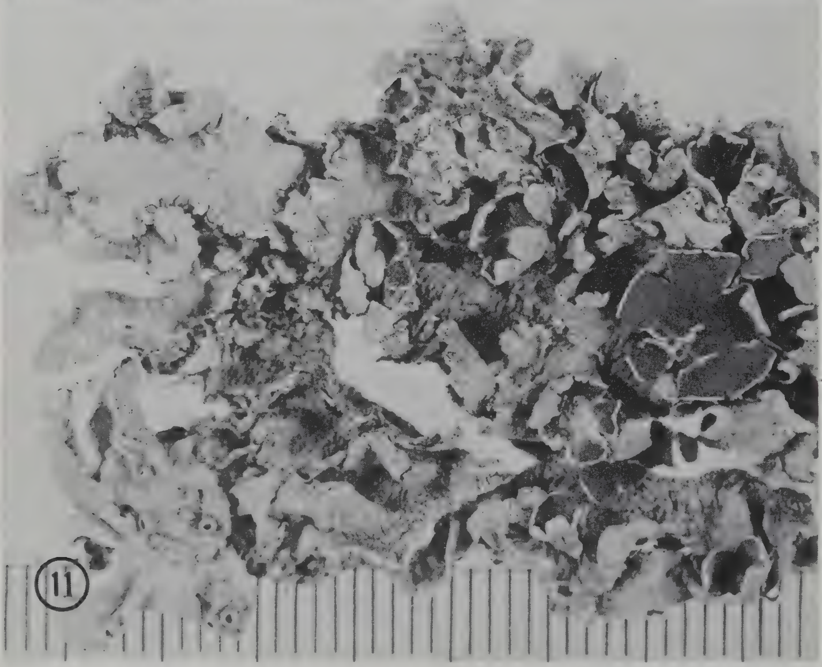

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MYCOTAXON

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A NEW HETEROCHAETE

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Heterochaete maculata Lowy, sp. nov. Figs. 1-2

Fructificatio in humido ceraceo-gelatinosa, tenua, resupinata, maculata, confluens, fusca, minuta (2-4 mm late X 50-75 μm crassa); in sicco atrofusca; setulis gelatinosus, rectus, scopulosus, dispersis, ± 70 X 30 μm, cum apicibus albidis; dikaryoparaphyseae angusto-cylindraceae, sparsae, ad apicem ramosae; hyphae nodosae; gloeocystidia numerosa, irregulariter subclavata, 45-55 X 6-8 μm; metabasidia plerumque ovoidea vel ovoidea-elongata, 16.5-21.0 X 8.5-10.5 μm, cruciatim septata; basidiosporae leviter curvato-cylindraceae, 10.5-12.0 X 4.5-5.5 μm, per repetitionem germinantes.

Holotype: Venezuela. Río Caracas, Dto. Fed. On unidentified wood, 22-VII-1972. Leg. K.P.Dumont, R.F.Cain, G.J. Samuels & B.Manara. Dumont VE-5672 (NY); Isotypes (LSUM), (VEN).

Fructification thin, waxy-gelatinous when wet, resupinate, appearing as irregular brownish spots or patches ± 2(-4) mm, becoming confluent; margin narrow, whitish and conspicuous; drying dark brownish; pegs erect, gelatinous, craggy (as seen by scanning electron microscopy), scattered, ± 70 X 30 μm, with whitish tips; dikaryoparaphyses few, narrowly cylindrical, up to 52 X 2.5 μm, apically dendroid; hyphae with clamp connections; gloeocystidia numerous, with homogeneous contents, irregularly subclavate, 45-55 X 6.0-8.0 μm; basidia densely clustered in a hymenial layer ± 25 μm thick; probasidia subglobose to ovoid, 8.0-9.5 X 8.5-10.5 μm; metabasidia mostly ovoid to ovoid-elongate, 16.5-21.0 X 8.5-10.5 μm, cruciate septate; crystalline accretions scattered throughout the subhymenium; basidiospores

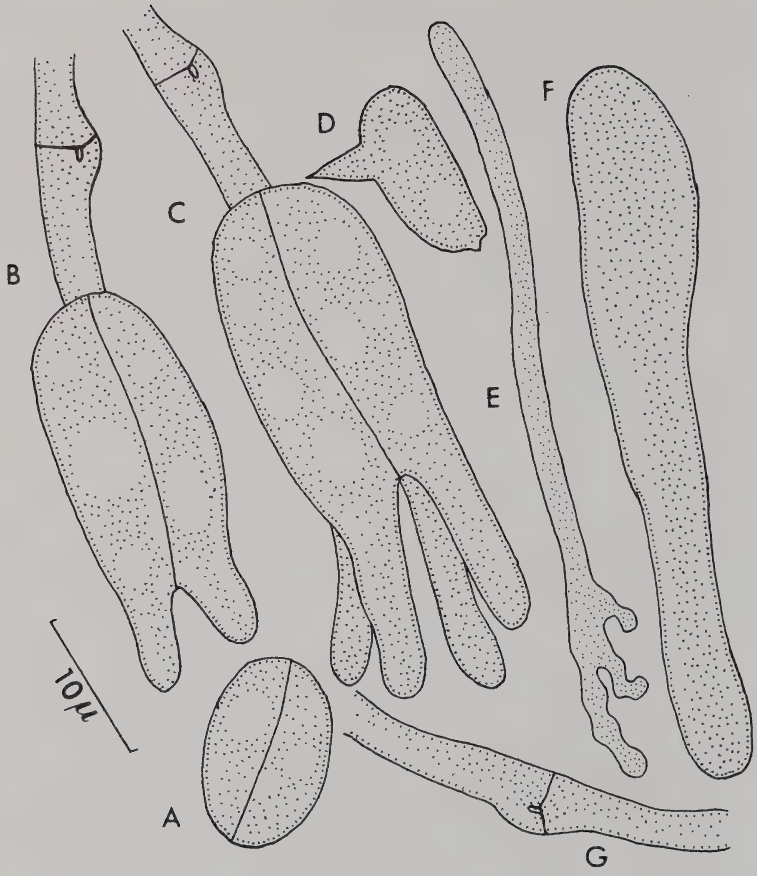

Fig. 1. Heterochaete maculata Lowy (Dumont-VE 5672). A, 2-celled probasidium; B, 2-sterigmate, developing basidium; C, 4-sterigmate metabasidium, sterigmata not fully formed; D, basidiospore germinating by repetition; E, apically branched dikaryoparaphysis; F, gloeocystidium; G, hypha with clamp connection.

slightly curved cylindrical, 10.5-12.0 X 4.5-5.5 μm, germinating by repetition.

One of the distinguishing criteria for the separation of Heterochaete from Exidia is the presence in the former

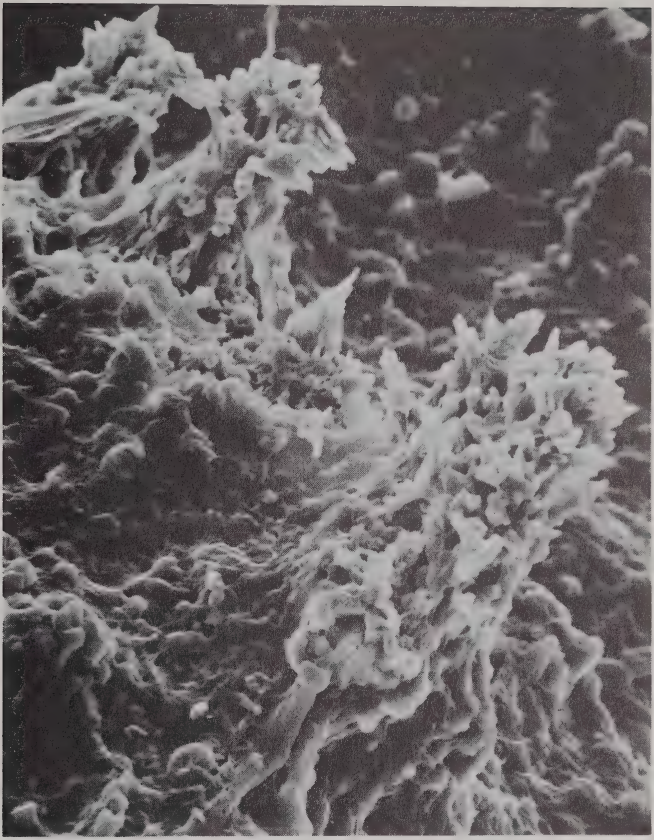

Fig. 2. Fragment of hymenial surface of Heterochaete maculata showing 3 pegs, one in foreground, two in background. Note also the convoluted hymenium. apx. × 1500.

of sterile hymenial structures termed pegs, which are gelatinized and composed of compact fascicles of more or less parallel hyphae that arise from the subhymenium. They may be quite small (as in H. maculata) but are generally clearly visible under a hand lens, although their distribution may be sparse. In order to examine more closely the gross structure of the pegs of H. maculata, a portion of the type collection was mounted with silver conducting paint on an aluminum disc, coated in vacuo with a layer of gold (ca 20 nm) and observed with a Hitachi S-500 scanning electron microscope operated at 20 kv. Fig. 2 shows that the pegs are composed of craggy bundles of gelatinized hyphae. A comparative study of the sterile hymenial elements of other Heterobasidiomycetidae (*Exidia*, *Pseudohydnum*, *Protodontia*) is under way, since this may reveal significant morphological features heretofor overlooked which may provide additional taxonomically useful criteria on the generic level.

The pegs of *Heterochaete* sometimes have basidiospores clinging to them and consequently may act as a spore dispersal mechanism through the agency of insects. The same may be true of the papillae of *Exidia* spp. which I have observed are also frequently covered with basidiospores. Sterile hymenial structures such as spines, setae and asterophyses, found in other Basidiomycetes, may serve this function as well.

The new species appears to be closest to *Heterochaete sanctae-martae* Bodman (1952) from Colombia, the type collection of which I have examined (SUI). *H. maculata* differs from this in its gross morphology, characterized by small, irregular patches surrounded by a whitish mycelial zone and by its prominent gloeocystidia (Fig. 1 F) which are absent in *H. sanctae-martae*.

ACKNOWLEDGMENT

For the operation of the scanning electron microscope the technical assistance of Mr. Michael T. Postek of the LSU Botany Department is gratefully acknowledged.

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UN NOUVEAU COLEOSPORIUM AUTOXENE (UREDINALES)

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Résumé : *Coleosporium himalayense* sp. nov. est une espèce microcyclique, autoxène sur *Pinus excelsa* WALL. trouvée dans l'Himalaya du Népal. Elle est voisine de C. *crowellii* CUMM. d'Amérique du Nord. On ne peut rapprocher ces deux Rouilles d'aucune autre espèce hétéroxène à cycle complet.

Summary : *Coleosporium himalayense* sp. nov. is a microcyclic species autoecious on *Pinus excelsa* WALL. found in Nepalese Himalaya. It is not very different from the North American C. *crowellii* CUMM. The two Rusts cannot be related with any other heteroxenous macrocyclic species.

La plupart des espèces du genre *Coleosporium* (Urédinales) sont des parasites à cycle complet ayant un Pin pour hôte écidien (stade *Peridermium*) et une Angiosperme pour hôte urédo-télien.

Il n'en existe qu'un petit nombre qui sont microcycliques, c'est-à-dire qui produisent seulement des "téliospores" (1), et se développent sur les aiguilles de divers Pinus, ce sont :

- *Coleosporium pinicola* (ARTH.) JACK. sur *Pinus virginiana* MILL. dans l'Est des Etats Unis.
- *Coleosporium pini-pumilae* AZBUK. sur *Pinus pumila* (PALL.) RGL. et *P. sibirica* (RUPR.) MAYR. en Sibérie.
- *Coleosporium crowellii* CUMM. sur *Pinus ayacahuite* EHRENB., *P. cembroides* ZUCC., *P. culminicola* ANDR. et BEAM. *P. edulis* ENGELM., *P. monophylla* TORR. et FREM. et *P. reflexa* ENGELM. au Mexique et dans le Sud des Etats Unis.

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(1) Chez les *Coleosporium* les cellules que l'on a appelé téliospores sont les basides mêmes et non des probasides comme chez la plupart des autres Urédinales.

Coleosporium crowellii se distingue très nettement en raison de la forme corniculée des téliosores, qui atteignent 1 et parfois 2 mm de haut, dans lesquels les téliospores sont disposées en longues chaines. Chez les deux premières espèces les sores forment une simple croûte où les téliospores sont aussi disposées en chaines, au moins chez *C. pinicola* (DODGE, 1925), mais très courtes avec seulement 2 ou 3 éléments bien différenciés. Un autre caractère distinctif est l'épaississement apical de la paroi des téliospores très développé pour les deux premières espèces : 50µ chez *C. pinicola*, 40µ chez *C. pini-pumilae* alors qu'il est pratiquement nul chez *C. crowellii*.

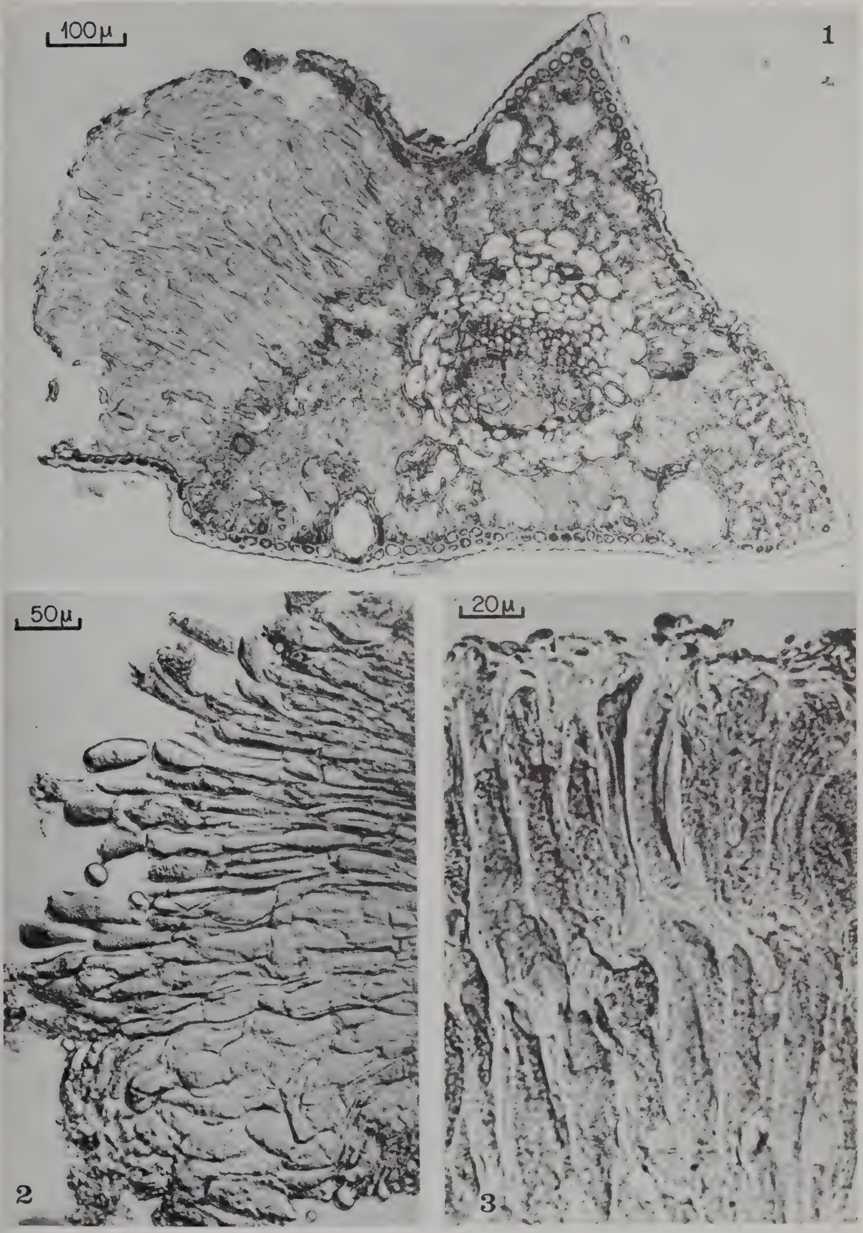
C'est de cette dernière espèce que se rapproche le plus une récente récolte réalisée dans l'Himalaya du Népal, pour laquelle je propose le binôme *Coleosporium himalayense*. Le parasite était abondant à la fin du mois de mai sur les aiguilles de l'année précédente de *Pinus excelsa* WALL., sur les pentes dominant l'aval de la vallée du Lantang vers 2700 m d'altitude. On rencontrait également, parfois sur les mêmes aiguilles, un *Peridermium* appartenant probablement au cycle de *Coleosporium campanulae* (PERS.) LEV. qui se comporte en hétéroxène et dont le stade Uredo est fréquent au voisinage sur *Campanula*. Par contre quelques centaines de mètres plus bas, dans les forêts de *Pinus roxburghii* SARG. on ne trouvait que le *Peridermium* mais pas l'espèce microcyclique.

Les téliosores développés sur les aiguilles de l'année précédente crèvent l'épiderme pour constituer des excroissances de couleur orangé clair et qui mesurent de 0,2 à 0,5 mm de haut, de 0,3 à 3,5 mm de long et de 0,2 à 0,3 mm de large.

Les téliospores sont disposées en chaines de trois à six cellules, étroitement comprimées les unes contre les autres et de ce fait de forme très variable , parfois irrégulière . Le plus souvent elles sont sensiblement cylindriques, leurs dimensions varient pour la longueur entre 50 et 125µ , pour le diamètre entre 15 et 30µ : elles sont très étirées dans la partie centrale du sore, nettement plus trapues dans les zones périphériques. Leur paroi est mince environ 0,5µ , sans épaississement apical.

Il n'est pas impossible que la taille, définitive des sores soit plus importante que celle que j'ai mesurée ; en effet, sur les spécimens récoltés, seulement un très petit nombre de téliospores sont arrivées à maturité et divisées en 4 cellules basidiales

Coleosporium himalayense n. sp. *Pycnia ignota. Aecia uredia-*



Coleosporium himalayense, I: coupe dans une aiguille de Pinus excelsa portant un sore.- 2: Sore écrasé montrant les téliospores disposées en chaînes.- 3: Téliospores des deux couches les plus externes.

que dessunt. Telia erumpentia epidermide rupto cincta, rufo-aurantiaca 0,3 - 3,5 mm *longa,* 0,2 - 0,3 mm *lata,* 0,2 - 0,5 mm *alta. Teliosporae catenulatae, irregulariter cylindraceae* 50 - 125 x 15 - 30µ, *epispora tenuis ad apicem non incrassata.*

In acuibus Pini excelsae WALL., *inter* Syabru Bensi et Syarpagaon, 2700 m. alt., *in* Langtang *valle,* Nepal, 25-6-74 G. DURRIEU. *Typus in T.L.A., isotypus in P.C.*

La distinction de C. *himalayense* avec les trois autres espèces microcycliques connues est aisée :

Les C. *pinicola* et C. *pini-pumilae* se séparent par :

- l'absence d'épaississement apical de la paroi.
- la disposition en chaînes plus longues des téliospores.

Par rapport à C. *crowellii* les téliosores ont la même structure colonnaire mais en plus court en raison du plus faible nombre de cellules présentes dans une même file (5 à 6 au lieu d'une dizaine). Notre espèce occupe ainsi une place intermédiaire entre les deux premières et C. *crowellii* Les téliospores en sont de formes et de dimensions beaucoup plus irrégulières : 50 - 125 x 15 - 30µ au lieu de 50 - 90 x 20 - 24µ . Ceci mis à part, les affinités entre les deux espèces sont certaines, affirmées en particulier par l'absence d'épaississement apical de la paroi.

On se trouve donc en présence de deux groupes de *Coleosporium* autoxènes nettement distincts : C. *pinicola* et C. *pini-pumilae* d'une part, C. *crowellii* et C. *himalayense* de l'autre. Par la morphologie de ses téliospores et leur disposition en croûte ne comportant qu'un petit nombre de couches de spores différenciées le premier groupe se rattache de façon indubitable aux *Coleosporium* à cycle complet. Chez ceux-ci on observe en effet des espèces montrant des téliospores disposées en courtes chaînes (ce qui avait amené DIETEL à les distinguer dans un genre particulier : *Stichopsora*). On peut donc penser que ce premier groupe dérive des espèces macrocycliques par un phénomène bien connu chez les Urédinales : transformation de la potentialité du mycélium dicaryotique primaire qui, au lieu de produire des écidiospores donne directement des téliospores (loi de TRANZSCHEL). C'est sur cette base qu'ARTHUR (1934) rapproche C. *pinicola* de C. *inconspicuum* HEDG. et LONG, qui forme ses télies sur *Coreopsis* et ses écidies sur *Pinus virginiana* hôte de la Rouille microcyclique. Les deux espèces de ce groupe ont pu s'individualiser de façon totalement indépendante puisque dans leur région d'origine existent des *Coleosporium* à cycles complets. Ceci est illustré par leur disjonction géographique et leur spécificité puisque, comme le fait remarquer AZBUKINA (1968), C. *pinicola* parasite un Pin de la section *Diplopinus* tandis que C. *pini-pumilae* est hébergé par des espèces de la section *Haplopinus*.

Quant au deuxième groupe, il est beaucoup plus délicat de lui trouver des affinités avec des espèces à cycle complet. Le rapprochement fait par CUMMINS (1959) entre C. *crowellii* et C. *jonesii* (PK.) AETH. ne me semble établi que sur la seule identité de l'hôte écidien de cette dernière espèce (*Pinus edulis*) mais n'est corroboré par aucun caractère morphologique. Les différences notées pour caractériser les deux autres espèces microcycliques se retrouvent également dans une comparaison avec l'ensemble des espèces hétéroxènes. Il semble que l'on se trouve en présence de Rouilles qui n'ont aucun correspondant macrocyclique actuel. Faut-il considérer ces espèces comme les survivants d'un groupe lui aussi hétéroxène aujourd'hui disparu ? L'ancienneté du genre *Pinus* connu depuis le début du Crétacé, qui se classe ainsi comme l'un des plus anciens dans la nature actuelle n'interdit pas cette hypothèse. Les hôtes téliens auraient pu être soit des Angiospermes primitives soit même des plantes d'autres groupes (Ptéridophytes ? Benettitales ?).

La position taxinomique des espèces microcycliques sur *Pinus* a depuis longtemps fait l'objet d'une attention particulière. C'est ainsi qu'ARTHUR créait en 1906 le genre *Galloways*, conception qu'il abandonnait par la suite, mais qui fut reprise plusieurs fois par d'autres mycologues. En se basant sur le seul C. *pinicola* il est évidemment difficile d'établir une distinction générique puisqu'il n'y a en fait aucune différence de structure télienne avec certaines espèces héteroxènes à téliospores brièvement caténulées (*Stichopsora* de DIETEL). On ne peut retenir le seul fait que ce *Coleosporium* se comporte en microcyclique, sinon il faudrait aussi envisager de subdiviser de nombreux autres genres d'Urédinales qui présentent plusieurs types de cycles biologiques. Les caractères propres aux espèces du deuxième groupe, comme l'a déjà fait remarquer PETERSON (1972) pour C. *crowellii*, sont par contre bien mieux marqués. Mais il ne me paraît pas utile, pour le moment, de vouloir les séparer dans un genre particulier. Il semble que dans les *Coleosporium* il existe tous les passages entre les espèces ne différenciant qu'une seule couche de téliospores jusqu'à celles les produisant en longues chaînes. Une étude d'ensemble aurait certainement l'intérêt d'apporter d'importantes données sur la phylogénie de ces Rouilles.

Remerciements :

Je remercie R.S. PETERSON, Santa Fe (New Mexico) qui m'a très aimablement fourni un abondant matériel de *Coleosporium crowellii* sur divers hôtes, M. G. VIENNOT-BOURGIN qui a bien voulu se charger de la critique du manuscrit, Mme SANGERMA, Mlle MARQUE et M. LLUBES qui m'ont apporté leur concours technique.

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GYMNOASCOIDEUS, A NEW GENUS OF THE GYMNOASCACEAE

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SUMMARY

Gymnoascoideus petalosporus gen. et sp. nov. of the Gymnoascaceae is described and discussed. Gymnothecial elements are similar to those of *Gymnoascus* Baran. Asexual spores and disposition of the ascospores in the ascus, as well as cultural characteristics distinguish this genus from others of the family.

INTRODUCTION

Species of *Petalosporus* Ghosh, Orr, and Kuehn, *Arachniotus* Schroeter, and *Pseudoarachniotus* Kuehn have been cited in the mycological literature with respect to their pathological implications as well as new isolations from various substrates (1, 5, 6, 20, 21, 23, 24) but without specific identification. A study of several of the strains so labeled and others isolated elsewhere have shown that they do not represent any of the genera noted (4, 18), but rather represent a new genus of the Gymnoascaceae. It is described and discussed below.

The term "gymnothecium (gymnothecia)" is used here, as suggested by Novak and Galcozy (11) for ascocarps of the Gymnoascaceae. "Arthroaleuriospores," as defined by Orr et al. (17), and concurred with by Kwon-Chung (10), and Sun and Huppert (26), is used here as the term for asexual spores.

TAXONOMY

GYMNOASCOIDEUS Orr, Roy, and Ghosh, gen. nov.

Gymnothecia discreta interdum praesentis, frequenter confluentia, plerumque globosa, elementis rectangulariter anastomosantibus et reticulum efformantibus; gymnothecia discreta frequenter absentia sed elementa typica in et circum caespites ascorum disposita, rectangulariter ramosa, ad apices obtusa, plerumque e sporis asexualibus bene tecta; caespites asci plus minus globosi vel subglobosi, evanescentes octospori; ascosporae flavae ad flavo-brunneae, oblatae, crassitunicatae glabrae; sporae asexuales in forma arthroaleuriosporium hyalinae vel brunneae cylindricae; hyphae ampullaceae praesentes.

Species typica: *Gymnoascoideus petalosporus* Orr, Roy, and Ghosh

Discrete gymnothecia sometimes present, frequently confluent, mostly globose; elements of the gymnothecia anastomosing at right angles to form a reticulum. Discrete gymnothecia frequently absent but with typical elements in and around the ascal clusters, branching at right angles, blunt at the apices, usually thoroughly covered by asexual spores. Ascal clusters more or less globose. Asci globose or subglobose, evanescent, 8-spored. Ascospores yellow to yellow-brown, oblate. Asexual spores of the arthroaleuriospore type, hyaline, buff, or brown, cylindrical, smooth. Racquet hyphae present.

Gymnoascoideus petalosporus Orr, Roy, and Ghosh, sp. nov. Figs. 1-20.

Fungus homothallicus. Gymnothecia discreta praesentia, plerumque confluentia, brunnea vel viridi-brunnea, plerumque globosa 150-750 (1050) μm diam, exappendiculata, elementis gymnothecia componentibus rectanguliter anastomosantibus et peridium clathratum efformantibus, glabrotunicatus, 3.1-5.6 μm latis; gymnothecia discreta frequenter carentiá, sed elementa typica peridialis rectangulariter ramosa et ad apices obtusa in et circum caespites ascorum disposita; caespites ascorum plus minus globosi, 65-510 μm diam, plerumque sporis asexualibus tecta; asci globosi, 4.9-7.7 μm diam vel subglobosi 4.2-8.4 x 3.7-10.2 μm, evanescentes octospori; ascosporae in dispositione petaloidea in asco, flavae usque flavo-brunneae, in ambitu circulares 3.5-4.2 μm diam vel ovatae usque ellipticae 1.4-3.5 x 2.6-4.9 μm glabrotunicatae; status asexualis in forma arthroaleuriosporarum plus minus cylindricarum, 1.4-5.6 x 2.1-11.9 μm, hyalinarum vel brunnearum glabrotunicatarum compositus;

hyphae ampullaceae praesentes.

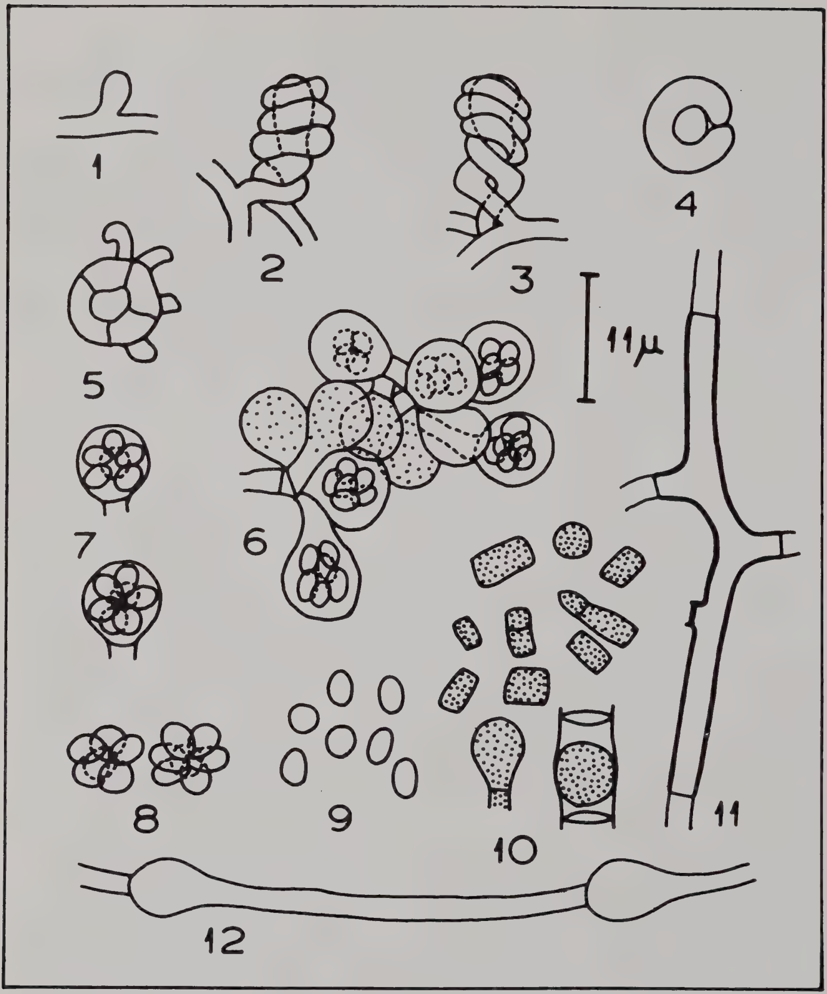
Fungus homothallic. Discrete gymnothecia sometimes present, mostly confluent, brown to greenish-brown, mostly globose, 150-750 (1050) μm diam, appendages lacking. Elements composing the gymnothecia anastomosing at right angles to form a latticelike peridium, walls smooth, 3.1-5.6 μm wide. Discrete gymnothecia frequently absent, but with typical peridial elements present in and around ascal clusters, branched at right angles, with blunt apices. Ascal clusters, usually covered by asexual spores, mostly globose, 65-510 μm diam. Asci globose, 4.9-7.7 μm diam or subglobose, 4.2-8.4 x 3.7-10.2 μm, evanescent, 8-spored, ascospores forming in a petaloid pattern within the ascus. Ascospores yellow to yellow-brown, circular in face view, 3.5-4.2 μm diam, or oval to elliptical in side view, 1.4-3.5 x 2.6-4.9 μm, walls thick, smooth. Asexual state of more or less cylindrical arthroaleuriospores, 1.4-5.6 x 2.1-11.9 μm, hyaline, buff or brown, walls smooth. Racquet hyphae present, usually associated with the gymnothecia or ascal clusters.

HOLOTYPE CULTURE (desiccated): 0-3325, from a nodular cyst on the eye of a human, Calcutta, India, deposited in the New York Botanical Garden. Isotype cultures and representative strains (desiccated disc cultures) have been deposited in the New York Botanical Garden, Bronx, New York 10458; Plant Pathology Herbarium, Cornell University, Ithaca, New York 14850; Farlow Herbarium, Harvard University, Cambridge University, Cambridge, Massachusetts 02138.

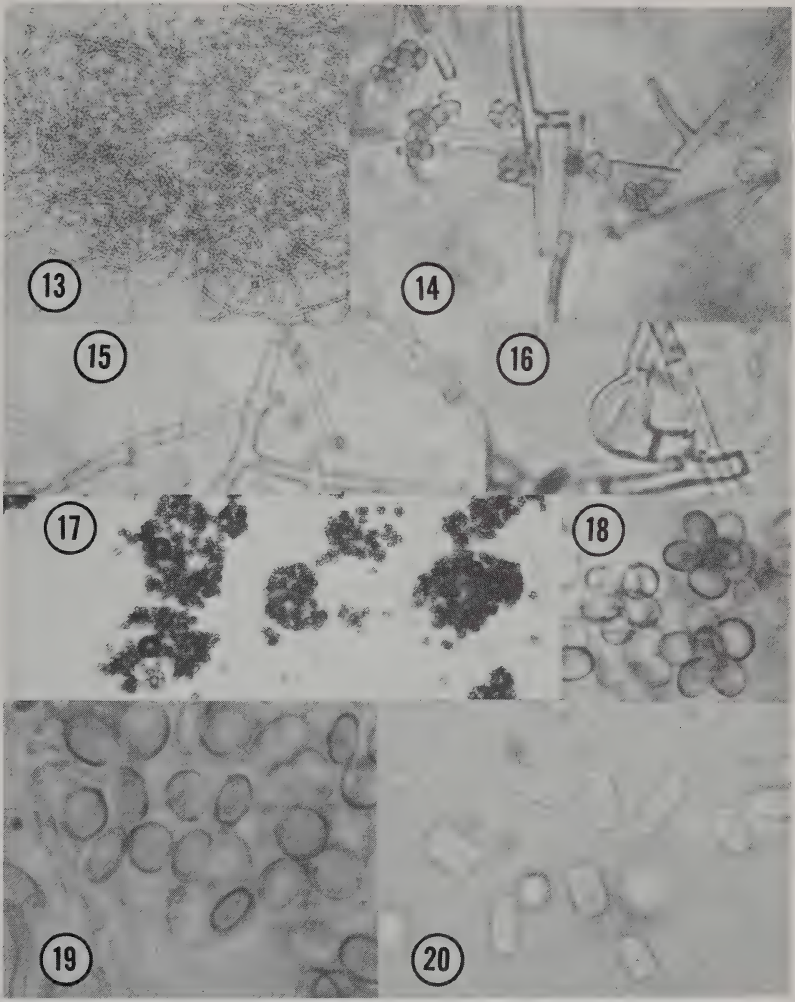
MATERIAL EXAMINED:

Soil isolates: INDIA: 0-2013 (Garg 1045), 0-3326 (Roi STM 1134), 0-3332 (Roi STM 1136); Ghosh and Roy isolates, 0-1239 (GR-62d), 0-1256 (GR-87), 0-1263 (GR-92), 0-1267 (GR-93), 0-1268 (GR-7), 0-1269 (GR-91). ITALY: all Varsavsky isolates, 0-3139 (I-13), 0-3164 (I-5), 0-3328 (I-79), 0-3334 (I-13A), 0-3341 (I-16, NRRL 6051), 0-3359 (I-14), 0-3386 (I-54), 0-3719 (I-14A). ENGLAND: 0-3442 (Dickinson 180). PANAMA: 0-3324 (Howard DHH 2). GUATEMALA: 0-3352 (Howard DHH 288c). U.S.A.: CALIFORNIA: Inyokern area, 0-3629.

Clinical sources: INDIA: 0-1270 (Ghosh GR-31) from tinea lesion, human; 0-3325 (Bose 503, NRRL 6001, UAMH 3589, ATCC 34351) from nodular cyst on eye, human. U.S.A.: CALIFORNIA: Los Angeles, 0-2067 (CBS 630.72) from tinea lesion, human. UTAH: Salt Lake City, 0-3552 (UAMH 3593) from tinea lesion, human; Bluffdale, 0-1505 (UAMH 3592) from tinea lesion, horse; Riverton, 0-3473 (IMI 183572, UAMH



Figures 1-12. Camera lucida drawings of structures of *Gymnoascoideus petalosporus*. Figs. 1-4. Sexual initials, lateral and top view. Fig. 5. Crozier formation. Figs. 6-7. Ascus and ascospore formation. Figs. 7-8. Petaloid position of ascospores. Fig. 9. Individual ascospores. Fig. 10. Arthroaleuriospores. Fig. 11. Typical peridial element. Fig. 12. Racquet hyphae.



Figures 13-20. *Gymnoascoideus petalosporus.* Fig. 13. Gymnothecium. x100. Fig. 14. Peridial element and ascospores in ascus. x450. Fig. 15. Typical peridial elements. x950. Fig. 16. Swollen node of peridial element. x450. Fig. 17. Ascal clusters. x45. Fig. 18. Ascospores in petaloid position within asci. x1000. Fig. 19. Ascospores. x950. Fig. 20. Arthroaleuriospores. x950.

3656) from tinea lesion, horse.

Other sources: INDIA: Orissa, 0-1163 (UAMH 3704) from rat dung; Jankia, 0-1177 (Ghosh GR-62, UAMH 3525) from horn. YUGOSLAVIA: S.R. Macedonia, 0-1299 (Hubálek 140 B) from feathers of *Passer domesticus* L. AUSTRALIA: Queensland, 0-3454 (Rees F 243) from feathers of a domesticated duck. ENGLAND (?): 0-3640 (UAMH 3527), contaminant in a culture of *Rollandina vriesii* Apinis (2). U.S.A.: ARIZONA, 0-2060 (Emmons 5006, CBS 629.72, NRRL 5544, ATCC 28556) from a rodent.

DISCUSSION

Colonies on Freezing agar (7), YpSs (3), SAB-PSA^2 (12), and Oatmeal-Salts agar (19) attain diameter of approximately 75-80 mm in 15-20 days at 30°C. Colonies are often at first white, arachnoid, becoming colored with patches of granular areas in shades of buff, tan, greenish-brown or brown shades. Sometimes colonies may not exhibit the white arachnoid mycelium, and instead may present tufted areas on the agar surface in the shades noted. Still other colonies may present a completely granular surface of these various colors. The colonial coloration is largely from the presence of asexual spores, which usually cover the gymnothecia or peridial elements and ascal clusters entirely. Reverse of the colonies is sometimes orange or brownish. Exudate or odor was not observed.

Sexual initials arise from the same or different parent hyphae (Figs. 1-4), one of the initials twining about the other (Figs. 2-4). Croziers (Fig. 5) are subsequently formed and produce asci (Figs. 6, 7).

Gymnothecia (Fig. 13) and ascal clusters (Fig. 17) may be present in the same culture, but gymnothecia are frequently absent, and only free elements of the same type as those forming the gymnothecia may be found among the ascal clusters (Figs. 11, 14, 15). Gymnothecia are more or less globose, and elements composing them are branched at right angles (Figs. 14, 15). This feature is similar to that found in species of *Gymnoascus* (15) and *Pseudogymnoascus* Raillo (22). Such elements tend to break off and present a blunt appearance. Appendages such as those found on peridial elements of *Gymnoascus* are lacking in *G. petalosporus*. Elements of *Gymnoascus* are smooth or asperulate and are usually smooth in *G. petalosporus* although they may occasionally be tuberculate. In addition, elements of *G. petalosporus* are sometimes enlarged and present an appearance similar to that of racquet hyphae and such elements do not tend to disarticulate. Occasional elements also become swollen at the nodes (Fig. 16) and somewhat resemble *Pseudogymnoascus*. Thin walled racquet hyphae (Fig. 12) are also present and are usually associated with the gymnothecia or ascal clusters.

Ascospores in the ascus assume a petaloid position (Figs. 7, 8, 18) similar to that found in species of *Petalosporus* (4). The morphology of the ascospores is similar to that of *Gymnoascus, Neogymnomyces* Orr (13), *Gymnascella* Peck (18), and *Pectinotrichum* Varsavsky and Orr (27) in being circular in face view and oval to elliptical in side view (Figs. 9, 19). They are also similar to ascospores of *Arthroderma* Berkeley and *Nannizzia* Stockdale and have been described by Padhye and Carmichael (19) as oblate spheroids. Although the ascospores assume the petaloid pattern (Figs. 4, 8. 14) similar to that of *Petalosporus,* they lack the slight lateral bulges characteristic of the ascospores of that genus. Ascospores of *Pseudogymnoascus* are ellipsoid to fusiform and have relatively thin walls compared to the walls of ascospores of the other genera noted above. The petaloid condition of the ascospores within the ascus is absent or rare in species of *Gymnoascus* and other genera of the Gymnoascaceae except *Petalosporus.*

Asexual spores of *G. petalosporus* are also similar to other related fungi producing arthroaleuriospores (Figs. 10, 20), especially species of *Malbranchea* Saccardo described by Singler and Carmichael (25). Unlike most Gymnoascaceae, however, arthroaleuriospores of this organism usually cover the gymnothecia, ascal clusters, and free peridial elements entirely. Except for aleuriospores in *Gymnoascus uncinatus* Eidam (15), asexual spores are unknown in species of *Gymnoascus.* Strains of *G. petalosporus* occasionally lose their ability to produce the sexual state and produce only arthroaleuriospores, thus resembling some strains of *Malbranchea* even more. Such spores are rarely of any value in determining species of the Gymnoascaceae.

One strain (O-2060) usually fails to produce peridial elements on any medium at 22-25^{O}C but will produce them on the same medium at 30^{O}C. Another strain (O-3139) produces mostly gymnothecia and rarely produces only elements under any conditions. In this strain, fewer asexual spores are produced and gymnothecia are rarely covered.

Strains of *G. petalosporus* were isolated from various substrates including clinical sources as have been many other Gymnoascaceae. Some of the strains obtained from soil were isolated with *Microsporum gypseum* (Bodin) Guiart and Grigorakis (approximately 25%). Those from clinical sources were often isolated with species of *Trichophyton* Malmsten. Although some strains have been implicated pathologically as species of *Petalosporus* (9), *G. petalosporus* has not been shown to be pathogenic (24). The significance of the association of *G. petalosporus* with pathogenic species has not been determined. The distribution of *G. petalosporus* is apparently worldwide.

Since there are several genera in the Gymnoascaceae that produce ascospores which appear circular in face view and oval to elliptical in longitudinal view, a key to these genera follows.

KEY TO GENERA OF THE GYMNOASCACEAE WITH DISCOID-OBLATE TYPE ASCOSPORES

A. Gymnothecial elements swollen at septa..............B
AA. Gymnothecial elements not swollen at septa..........F
B. Gymnothecia dark colored, ascospores rimmed..*Tripedotrichum*
BB. Gymnothecia light colored..........................C
C. Gymnothecial appendages ctenoid or pectinate.........D
CC. Gymnothecial appendages otherwise...................E
D. Gymnothecial elements surrounding a cleistothecium enclosing the asci and ascospores..........*Ctenomyces*
DD. Gymnothecial elements surrounding free asci and ascospores..............................*Pectinotrichum*
E. Swellings at septa regularly present resembling swollen joints, appendages bifurcate apically......*Macronodus*
EE. Swellings at septa infrequent not resembling swollen joints, appendages hooked or branched.......*Gymnoascus*
F. Gymnothecia not netlike, elements arising at the base of ascal clusters...................................G
FF. Gymnothecia netlike...................................H
G. Gymnothecia present or absent; when present, elements tuberculate.............................*Gymnascella*
GG. Gymnothecia present, appendages uncinate, heterothallic...................................*Uncinocarpus*
H. Ascospores regularly in a petaloid pattern within the ascus...I
HH. Ascospores rarely in a petaloid pattern within the ascus...J
I. Ascospores with slight lateral bulges.....*Petalosporus*
II. Ascospores lacking lateral bulges.......*Gymnoascoideus*
J. Gymnothecial appendages sinuous, without spirals...*Neogymnomyces*
JJ. Gymnothecial appendages terminating spirals..........K

K. Gymnothecial elements tending to disarticulate, ascospores grooved on longitudinal axis.........*Shanorella*

KK. Gymnothecial elements tending to disarticulate, ascospores lacking grooves on longitudinal axis..........L

L. Individual elements unequally swollen at ends, cameloid, spinose..............................*Arthroderma*

LL. Individual elements slightly swollen at ends, bone shaped, smooth or rugose...................*Nannizzia*

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A NEW SPECIES OF GYMNOASCUS

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Gymnoascus intermedius n. sp. is described and compared with other species of the genus.

INTRODUCTION

Several strains of a gymnoascaceous fungus have been encountered during the routine screening of soils for fungi. Examination of these strains indicated that they represented a new species of *Gymnoascus* Baranetzky. It is described below.

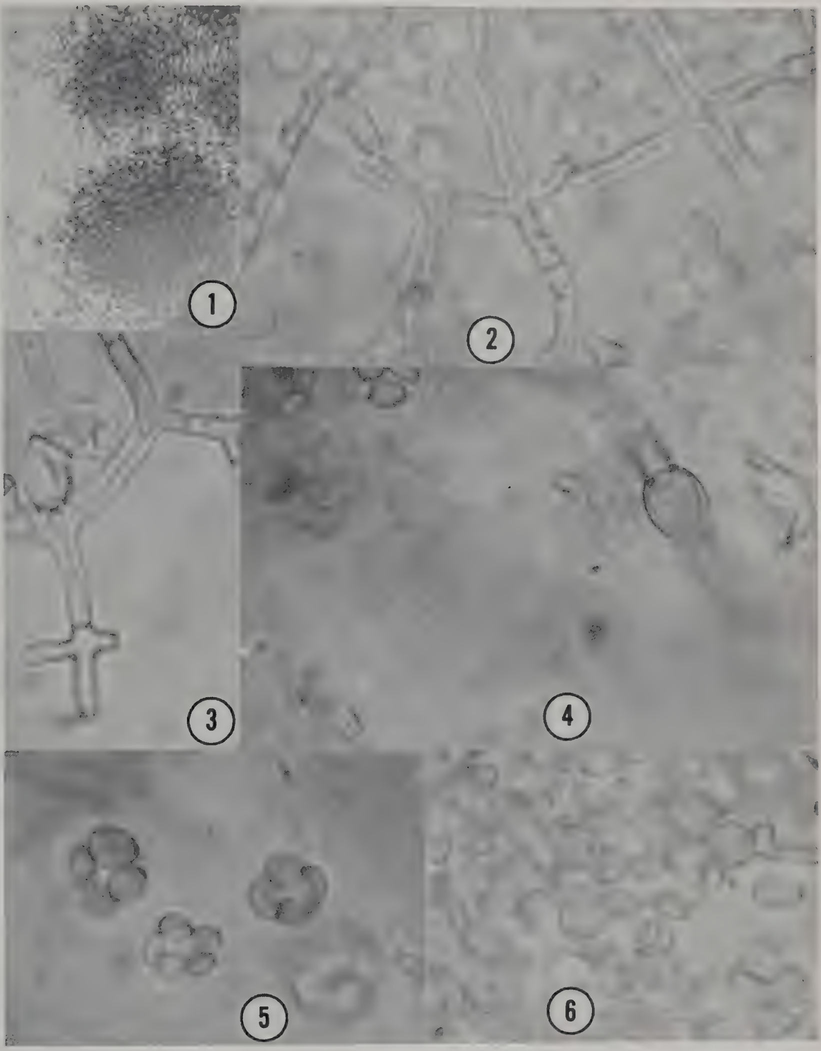
A desiccated disc culture of the holotype has been deposited in The New York Botanical Garden (NYBG), Bronx, N.Y. Desiccated disc cultures of isotypes and representative strains have been deposited in NYBG, Plant Pathology Herbarium, Corness University (CUP), Ithaca, N.Y., and in The Farlow Herbarium (FH), Harvard University, Cambridge, M.A.

TAXONOMY

Gymnoascus intermedius Orr, sp. nov. (Figs. 1-6)

Fungus homothallicus. Gymnothecia discreta praesentia plus minus globosa, 75-470 μm diam, confluentia flava vel galbina, exappendiculata; elementa gymnothecia componentia anastomosantia et peridium clathratum efformantia, glabra, 1.9-3.4 μm latis; asci elliptici, 5.7-6 x 6-8.6 μm, hyalini evanescentes octospori; ascosporae flavidulae crassitunicatae glabrae, in ambitu circulares, 3.4-4 μm diam, vel ovatae usque ellipticae 1.9-2.3 x 3.6-4 μm; status asexualis ignotis; hyphae ampullaceae praesentis.
Holotypus: in solo, Palo Verde, California, U. S. A., April 1959, Orr O-313.

Fungus homothallic. Discrete gymnothecia present, more or less globose, 75-470 μm diam, confluent, in shades of yellow or yellow-green, appendages lacking; elements comp-



Figures 1-6. *Gymnoascus intermedius*. Fig. 1. Gymnothecia. x450. Fig. 2. Peridial elements. x1050. Fig. 3. Swollen node at element juncture. x1050. Fig. 4. Ampulliform swelling in peridial element. x1050. Fig. 5. Ascospores in asci. x1250. Fig. 6 Ascospores. x1250.

rising the gymnothecia anastomosing to form a latticelike peridium, smooth 1.9-3.4 μm wide. Asci elliptical, 5.7-6 x 6-8.6 μm, hyaline, evanescent, 8-spored. Ascospores yellow, walls smooth, circular in face view, 3.4-4 μm diam, or oval to elliptical in side view, 1.9-2.3 x 3.6-4 μm. Asexual spores unknown. Racquet hyphae present, in association with the gymnothecia.

Colonies on Freezing agar (2) and Oatmeal-Salts agar (8) green to yellow green, attaining a diameter of approximately 80 mm in 20-30 days at 25-30°C; reverse coloration, odor or exudate not observed.

Sexual initials arising after 8-10 days from the same or different parent hyphae, one coiling about the other. Croziers soon produced, with asci forming in 10-15 days. Young gymnothecia (Fig. 1) containing asci and ascospores (Fig. 5) produced within 20 days and usually maturing by 30 days.

Material examined: U. S. A.: California: Palo Verde area, soil, Orr O-104 (QM 9340), O-291, O-313 (NRRL 6272, ATCC 28555); lung of a pocket mouse, Orr O-651.

DISCUSSION

Gymnothecia of *G. intermedius* are numerous, confluent, interlocking with one another. They are fragile and break easily upon separation so that many square, blunt ends are present (Figs. 2, 3). Gymnothecia are typical of the genus (5) in possessing anastomosing elements forming a latticelike peridium (Fig. 2).

Junctions of the peridial elements (nodes) are occasionally swollen (Fig. 3) and are similar to those observed in species of *Pseudogymnoascus* Raillo (9). Occasional elements in the peridial lattice become swollen (Fig. 4). This feature is rather infrequent in the Gymnoascaceae but has been observed in *Gymnoascoideus* Orr, Roy & Ghosh (7). Septal swellings in hyphal elements and appendages similar to those found in *Auxarthron* Orr & Kuehn have been reported by Apinis (1) and Samson (10) for species of *Gymnoascus*. I have observed swellings only in *G. uncinatus* Eidam; they are unlike those of *Auxarthron*. Septal swellings in *Auxarthron* and other genera were considered in detail by Orr (4). Variation in *G. reessii* Baran. was discussed by Orr et al. (6) and in *Gymnoascus* by Samson (10).

Ascocarps of *Gymnoascus intermedius* lack appendages as well as the "boat-hook" type branches considered typical of *Gymnoascus* by Orr et al. (5). Such gymnothecia may be confused with those of *Gymnoascoideus petalosporus* Orr, Roy & Ghosh (7) because of the numerous blunt ends present on peridial elements of both. Gymnothecia of the former, however, are yellow to yellow-green, and those of the latter are brown to greenish-brown. Furthermore, free elements and gymnothecia are covered by asexual spores in *Gymnoascoideus petalosporus*, but such spores are lacking in *Gymnoascus intermedius*.

Ascospores of *G. intermedius* are circular in face view oval to elliptical in side view (Figs. 2, 5, 6). This ascospore morphological type is common to several genera in the Gymnoascaceae (4). Padhye and Carmichael (8) have termed this ascospore shape, in species of *Nannizzia* Stockdale and *Arthroderma* Berkeley, to be "oblate spheroids." A key to the genera of the Gymnoascaceae producing such ascospores was prepared by Orr (4).

Asexual spores are absent in *G. intermedius* as in most species of *Gymnoascus* (5). *Gymnoascus uncinatus*, however, produces terminal aleuriospores and intercalary arthroaleuriospores.

Many of the Gymnoascaceae, including species of *Gymnoascus*, have been implicated pathologically (3). *Gymnoascus intermedius* has been isolated from soil and from the lung of a pocket mouse. Pathogenicity of *G. intermedius* has not been demonstrated.

There is little doubt that *G. intermedius* is closely related to *G. reessii* and other species of *Gymnoascus*. It is possible that *G. intermedius* may also be related to *Gymnoascoideus* and to *Pseudogymnoascus*. Genetic and scanning electron microscope studies might be useful in defining relationships of these genera more closely.

KEY TO SPECIES OF GYMNOASCUS

A. Peridial appendages lacking............*G. intermedius*
AA. Peridial appendages, long and/or short, present......B
B. Elongate appendages uncinate, short ones hooked...... ....*G. uncinatus*
BB. Elongate appendages otherwise.......................C
C. Appendages greatly elongate (to 500 μm), short ones sinuous, hooked.......................*G. longitrichus*
CC. Appendages otherwise................................D
D. Elongate appendages branched with side branches curved or hooked...........................*G. reessii*
DD. Elongate appendages with two apical recurving hooks.. ....*G. dugwayensis*

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NOTES ON CORTICIACEAE

(BASIDIOMYCETES)

by

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Flavophlebia (Parm.) is given generic rank. *Sistotrema subangulisporum*, a species related to *Sistotrema pistilliferum* Hauerslev but without clamp connections and cystidia, is described as new. Also some new combinations are made viz. *Flavophlebia sulfureo-isabellina, Hypochnicium cymosum* and *Phlebia cremeo-alutacea.*

Flavophlebia (Parm.) K.-H. Larss. & Hjortst. nov. gen.

BASIONYM: *Phlebia* Fr. subgenus *Lilaceophlebia* Parm. sectio *Flavophlebia* Parm. Consp. syst. Cort. p 94, 1968.

GENERITYPUS: *Flavophlebia sulfureo-isabellina* (Litsch.) K.-H. Larss. & Hjortst.

Fruitbody resupinate, effused, at first thin, with age thickening, hymenium ceraceous, continuous, cracking with age, margin indistinctly thinning out. Hyphal system monomitic, individual hyphae mostly indistinct, thinwalled, with clamps. Cystidia cylindrical to subfusiform, thinwalled, normally enclosed. Basidia terminal, slightly stalked, with basal clamp, normally with four sterigmata. Spores oblong, subglobose or globose with sublateral apiculus, smooth, neither cyanophilous nor amyloid or dextrinoid.

Flavophlebia sulfureo-isabellina (Litsch.) K.-H. Larss. & Hjortst. nov. comb.

BASIONYM: *Corticium sulfureo-isabellinum* Litsch. in Pilát

Acta Mus. Nat. Pragae 2B (3):43, 1940.

Fruitbody resupinate, effused, thickening, ceraceous, cracking, in colour yellowish turning to ochraceous or pale brown, margin indistinct. Hyphal system monomitic, individual hyphae mostly indistinct, thinwalled, 2-2,5 um wide, those of the subhymenium sparsely branched, all hyphae with clamps. Cystidia cylindrical or subfusiform, thinwalled, enclosed or slightly projecting, 50-80 x 6 um. Basidia terminal, clavate, 20-30 x 6-8 um, with basal clamp, 4-sterigmate. Spores oblong, subglobose or rarely globose with sublateral apiculus, thinwalled, smooth, 7-8 x 5-6 um, with oily substance dispersed in the protoplasm.

HABITAT. As far as we know only collected on *Abies*. This circumstance may explain why no Swedish specimens are hitherto gathered.

DISTRIBUTION. Not yet collected in Scandinavia but is not uncommon in the Carpathians. Also noted from Austria, SSSR and France. A number of collections from North America have been studied.

REMARKS. In general aspect, *Flavophlebia sulfureo-isabellina* reminds one of *Phlebia,* which, however, in its wide sense no doubt is heterogeneous. Most species of *Phlebia* have spores which are allantoid, cylindrical or elliptical and basidia narrowly clavate. The fructifications vary in texture, sometimes ceraceus but mostly gelatinous as in the type species, *Phlebia radiata* Fr., which also has a more or less folded hymenium. This is not the case with the treated species. According to Parmasto, in his description of the section *Flavophlebia,* the basidia are broader and the basidiospores subglobose. Besides, the lateral attachment of the apiculus make the spores remind one of those of *Radulomyces confluens* (Fr.) M.P. Christ. However, there are no other links between *Radulomyces* and *Flavophlebia.*

In our opinion *Flavophlebia* is easily recognized by its yellowish fructification, clavate basidia, and by its subglobose, oilrich spores with distinct, sublateral apiculus.

For further information see Jackson (1948) who has thoroughly interpreted the species.

MATERIAL STUDIED. Poland. Nawojowa, Rezerwat Scisly Labowiec, 1973-09-11, Hallenberg,Hjortstam,Larsson 2003, 2006; Nawojowa, Rezerwat Scisly Labowiec, 1973-09-12, Hallenberg,Hjortstam,Larsson 2228, 2251, 2312; Babia Gora national park, 1973-09-15, Hallenberg,Larsson 2645, 2649; Babia Gora national park, 1973-09-16, Hallenberg,Larsson 2736. — SSSR. Bhodai potok Sheshulets, *Abies alba*, ad caudicem prolapsum putridum in piceeto, 1956-08-17, Parm. TAA-3929; Regio Krasnodar, Reservatum Caucasicum, Lager Tjagenja, *Abies Nordmanniana*, ad caudicum prolapsum in abieteto, 1966-09-18, Parm. TAA-19577. — France. Hte Garonne, Luchon, sur *Abies*, 1956-09-18, Boidin Ly 2435, (as *Gloeocystidiellum sulfureo-isabellinum*). — Canada. Ontario, L. Timagami, Gull L.P., on bark of *Abies balsamea* 1936-08-10, leg R. Biggs, det H.S. Jackson, Hb Cain 8811; Ontario, L. Timagami, Gull L.P., on *Abies balsamea*, 1935-08-06, leg R. Biggs, det V. Litschauer, Hb Cain 7365; Ontario, Algonquin pk, mileage 2, on *Abies balsamea*, 1940-10-13, H.S. Jackson, Hb Cain 12727; Ontario, Oxbow lake, W. of Algonquin pk, on *Abies balsamea*, 1941-08-20, leg R.F. Cain, det H.S. Jackson, Hb Cain UT 17919; Ontario, Dorset, Clear lake, on down *Abies balsamea*, 1954-10-06, leg M.k. Nobles, det J. Speirs, DAOM 52065; Nova Scotia, Sherbrook lake, Lunenburg Co., on *Abies balsamea*, 1954-07-05, J. Speirs, DAOM 31445.

Hypochnicium cymosum (Rog. & Jacks.) K.-H. Larss. & Hjortst. nov. comb.

BASIONYM: *Peniophora cymosa* Rog. & Jacks. Can. Journ. Res. C 133, 1948.

Syn.: *Lagarobasidium cymosum* (Rog. & Jacks.) Jülich.

Fruitbody resupinate, effused, often very thin and rather inconspicuous, whitish, smooth. Hyphal system monomitic, basal hyphae more or less distinctly thickwalled, 4-7 um wide, subhymenial hyphae thinwalled or slightly thickening, all hyphae with clamps. Cystidia subulate, thickwalled. somewhat sinuous, clamped at the base, 40-80 um long, projecting. Basidia subclavate, slightly sinuose, with clamped base, 10-15 x 4-6 um, 4-sterigmate. Spores subglobose, thickwalled, cyanophilous, 5 x 4 um, non-amyloid.

HABITAT. On decayed spruce wood

DISTRIBUBUTION. Earlier known from a few localities in North America and is certainly very rare everywhere. The species was previously not reported from Europe.

REMARKS. Jülich (1975) incorporated the species in *Lagarobasidium* with type species *Odontia pruinosa* Bres. Eriksson and Ryvarden (1976) in the Corticiaceae of North Europe make it clear that this species is the same as *Peniophora detritica* Bourd. & Galz. and they refer the species to *Hypochnicium* owing to its thickwalled and cyanophilous spores.

Peniophora cymosa is closely related to other species in *Hypochnicium*, preferably in having thickwalled and cyanophilous spores and in the shape of the basidia. It therefore ought to be referred to this genus.

MATERIAL STUDIED. Sweden. Västergötland, Töllsjö par., on stump of *Picea abies*, 1976-08-01, Hjm 6767. — Norway. Rana, Örtfjellmoen, on *Picea*, 1976-09-11, K-H Larsson s.n. — Poland. Zakopane, Morskie oko national park, on trunk of *Picea abies*, 1973-09-17, Halleberg,Larsson 2924. — Canada. Ontario, Timagami Lake, Bear Island, on wood of conifer, 1936-o8-19, leg R. Biggs, det H.S. Jackson.

Phlebia cremeo-alutacea (Parm.) K.-H. Larss. & Hjortst. nov. comb.

BASIONYM: *Metulodontia cremeo-alutacea* Parm. Consp. syst. Cort. p 216, 1968.

Fruitbody resupinate, adnate, effused, firm, ceraceous, under a lens slightly velutinous (projecting cystidia), in colour ochre-yellowish, margin indistinct or whitish. Hyphal system monomitic, hyphae mostly indistinct, thinwalled, 2-3 um wide, with clamps. Cystidia numerous, richly encrusted, projecting, conically tapering, mostly 40-50 x 19-12 um, non-cyanophilous, non-amyloid. Basidia narrowly clavate, sometimes slightly constricted, 15-20 x 3,5-4 um, with 4 conspicuous sterigmata, about 5-8 um long. Spores ellipsoid, smooth, thinwalled, 4-4,5 x 2,5-3 um, non-amyloid, non-cyanophilous.

HABITAT. Most collections on coniferous wood but also on *Alnus* and other wood of deciduous trees.

DISTRIBUTION. A rare species in Sweden with few collections from Småland, Västergötland and Uppland. Also collected in Norway.

REMARKS. When Eriksson and Ryvarden (1976) treated the genus *Metulodontia* they excluded *M. cremeo-alutacea* owing to its relationship to the phlebioid fungi. As this idea is quite useful we have chosen to propose the new combination. The species fits well in *Phlebia* because of its sub-ceraceous fruitbody, conglutinate hyphae and narrow basidia. The strongly encrusted cystidia makes *Ph. cremeo-alutacea* similar to e.g. *Peniophora hydnoides* Cke. & Massee and *Phlebia gigantea* (Fr.) Donk of which at least the first one probably is a member of *Phanerochaete* Karst., but it differs from this genus i.a. in the presence of clamps.

MATERIAL STUDIED. Sweden. Småland, Femsjö par., Stenekullarna, NE of Kulkagölen, on decayed coniferous wood, 1939-10-06, Lundell 1690; Västergötland, Göteborg, St. Änggården, on stem of fallen *Alnus glutinosa*, 1938-10-28, T. Nathorst-Windahl

1337, 1835; Östad par., E of Valsjön, on fallen trunk of *Pinus*, 1968-05-02, Hjm s.n.; Dalsland, Sundals-Ryr par., N of Bollungen, on fallen trunk of *Pinus*, 1970-09-29, Hjm 3767; Uppland, Uppsala, Kronoparken, on decayed coniferous wood, 1932-09-13, Lundell 2059. — Norway. Rana, Örtfjellmoen, 76-09-11, K.-H. Larsson s.n. — SSSR. Regio Montano-Altaica, reservatum Altaicum, Oior, *Abies sibirica*, ad caudicem prolapsum in piceeto-pineto, alt. 800-900 m, 1959-08-21, Parm. 7908.

Sistotrema subangulisporum K.-H. Larss. & Hjortst. nov. spec.

Fructificatio resupinata, effusa, tenuis, hymenio ubique sulphureo, margine simili; hyphis tenuitunicatis, circiter 2,5 um latis, fibulis nullis; cystidiis nullis; basidiis urniformibus 20-25 x 5 um, certe 6-sterigmatibus, distincte incurvatis; sporis tenuitunicatis vel crassiusculis, hyalinis, subangulatis, 3,5-4 x 5-6 um vel diametro 4-5 um, nonamyloideis.

HOLOTYPUS: Sweden, Västergötland, Töllsjö par., NE of Skåpeskulle, on decayed *Pinus silvestris*, 1969-08-23, Hjm 1508.

Fruitbody resupinate, effused, closely attached to the substrate, thin, smooth, margin not differentiated. Hyphal system monomitic, hyphae thin or slightly thickening, 2-3 um wide, without clamps. Cystidia none. Basidia urniform, 20-25 x 5 um, with 6 (8) curved sterigmata. Spores subangular, smooth, with somewhat thickened walls and distinct apiculus, 3,5-4 x 5-6 um or 4-5 um across, non-cyanophilous, non-amyloid.

HABITAT. On decayed corticate or decorticate wood of *Pinus* in mixed forest (*Pinus, Picea, Quercus, Betula, Sorbus*) as well as in wet forests with *Sphagnum*.

DISTRIBUTION. A rare species and only noticed a few times in Västergötland in the SW part of Sweden.

REMARKS. *Sistotrema subangulisporum* is easily recognized by its yellowish fruitbody, angular basidiospores and hyphae without clamps. *Sistotrema pistilliferum* Hauerslev is close to the new species in having the same kind of spores but is in other respects well separated by its cystidia and the presence of clamps at all septa. *Sistotrema subtrigonospermum* Rogers also has angular spores but the symmetrical arrangement is different.

ADDITIONAL MATERIAL STUDIED. Sweden. Västergötland, Alingsås par., east side of lake L. Trän, on branch of *Pinus* in

Sphagnum-Picea forest, 1971-09-04, K.-H. Larsson 147, 150; Töllsjö par., N of the little lake Flottatjärn, on decayed coniferous wood, 1968-09-29, Hjm. s.n.; SE of the farmstead Holmared, on decayed trunk of *Pinus*, 1969-08-25, Hjm. 1580.

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MYCOTAXON

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NOTES ON HYPHOMYCETES. XVII.
A NEW SPECIES OF *PSEUDOSPIROPES*.

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ABSTRACT

Pseudospiropes lotorus Morgan-Jones is described and illustrated from an isolate from roots of *Lotus corniculatus* collected in Alabama.

INTRODUCTION

An isolate of a dematiaceous hyphomycete obtained from roots of *Lotus corniculatus* L. has been determined as an undescribed species of *Pseudospiropes* M. B. Ellis. This genus was established by Ellis (1971) to accommodate two taxa previously classified in *Helminthosporium* Link ex Fries but which possess macronematous thick-walled conidiophores bearing integrated, sympodial and heavily cicatrized conidiogenous cells. Holubova-Jechova (1973) transferred a third species to it from *Helminthosporium* and Sutton (1973) added a new species. Ellis (1976) further extended the genus to include three species which Hughes (1958) reclassified from *Helminthosporium* in *Pleurophragmium* Constantin. These have less prominent conidiophore scars than those species placed in *Pseudospiropes* initially. Ellis also added two new species. Species classified in *Pleurophragmium* differ from those of *Pseudospiropes* by the possession of subulate denticles on the conidiogenous cells.

TAXONOMIC PART

Pseudospiropes lotorus sp. nov. (Fig. 1).

Coloniae effusae, fuscae vel atrae, pilosae. Conidiophora macronemata, mononemata, erecta, recta vel flexuosa, crasse tunicata, septata, brunnea, apiceum versus pallidiora, laevia, cicatricibus conidialibus praedita, 90 - 180 X 4 - 6μm, basi interdum ad 12μm inflatum. Cellulae conidiogenae polyblasticae, in conidiophoris

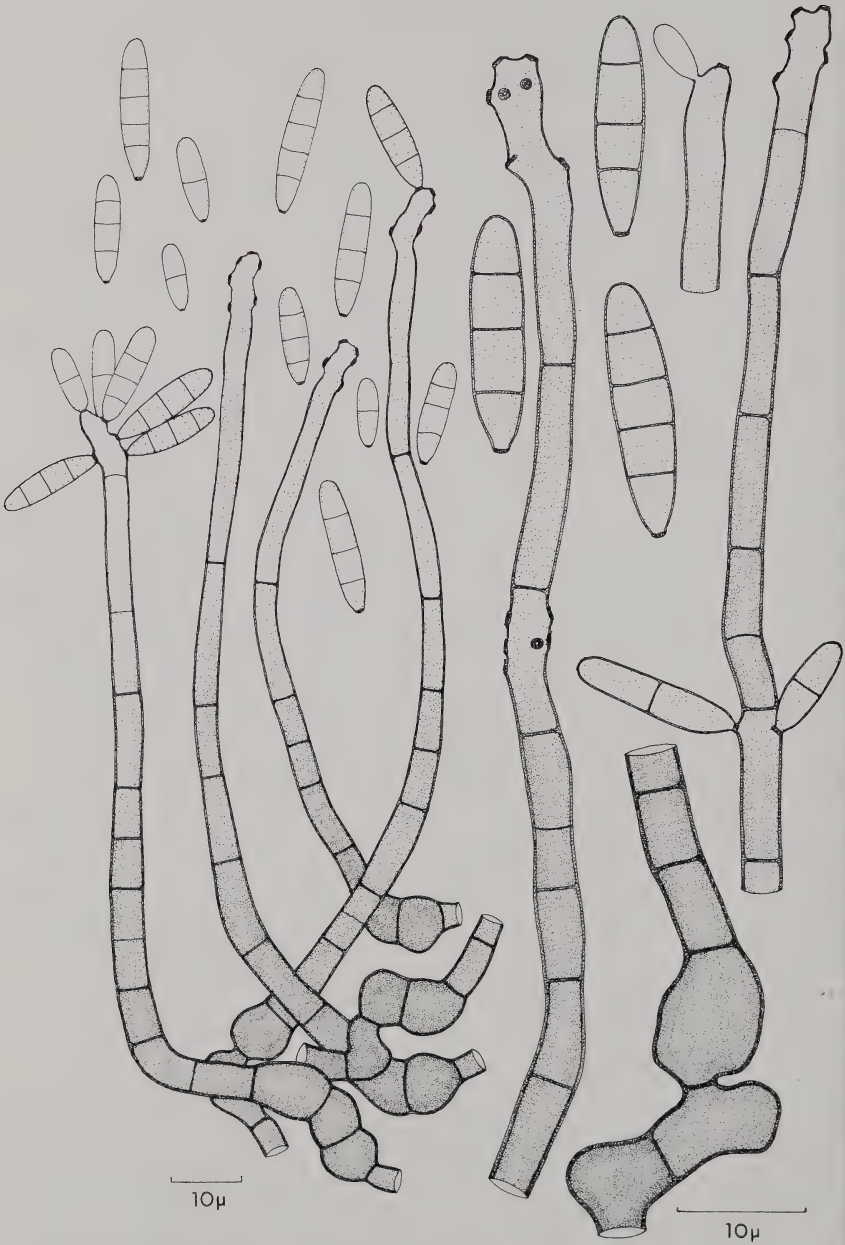

FIGURE 1. *Pseudospiropes lotorus.*
Conidiophores and conidia.

incorporate, terminales, interdum intercalares, sympodiales, cylindricae, usque ad 8 cicatricles. Conidia solitaria, sicca, acropleurogena, simplicia, ellipsoidea vel cylindrica, basi truncata, pallide brunnea, laevia, 1 - 4 septata, plerumque 3 septata, 10 - 17 X 3 - 4μm.

In culturis ex radicibus Loti corniculati, Auburn, Lee County, Alabama, June 1976, E. M. Clark, BPI, holotypus.

Colonies effuse, brown to black, hairy. Mycelium composed of flexuous, slender, branched, septate, smooth-walled, subhyaline to very pale brown hyphae, 1.5 - 3μm wide. Conidiophores macronematous, mononematous, frequently caespitose, simple but sometimes branched at the extreme base, erect, straight or somewhat flexuous, smooth, brown to pale brown, paler towards the apex, up to 19-septate, septa often close together and thin, 90 - 180 X 4 - 6μm, up to 12μm wide at the swollen base. Conidiogenous cells polyblastic, integrated, terminal but some times intercalary, sympodial, cylindrical, bearing a number of flat, small, dark, slightly protruding scars, 1 - 1.5μm in diameter. Conidia solitary, dry, acropleurogenous, simple, narrowly ellipsoid to cylindrical, very pale brown, smooth, 1 to 4-septate (mostly 3), with a distinct scar at the base, 10 - 17 X 3 - 4μm.

Isolated from roots of *Lotus corniculatus* L.; N. America.

Collection examined: Culture from *L. corniculatus*, Auburn, Lee County, Alabama, June 1976, E. M. Clark, BPI, AUA, type.

P. lotorus resembles *P. subuliferus* (Corda) M. B. Ellis and *P. rousselianus* (Mont.) M. B. Ellis. It differs from the former in having ellipsoid rather than clavate conidia, from the latter in having fewer conidial septa and from both by the possession of considerably smaller conidia.

ACKNOWLEDGMENT

I thank Dr. J. L. Crane, Illinois Natural History Survey, for reviewing the manuscript.

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MYCOTAXON

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NOTES ON HYPHOMYCETES. XVIII. *CHAETOBLASTOPHORUM INGRAMII* GEN. ET SP. NOV. AND *CYLINDROTRICHUM OBLONGISPORUM* SP. NOV.

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ABSTRACT

Chaetoblastophorum ingramii Morgan-Jones, a new genus and species, and *Cylindrotrichum oblongisporum* Morgan-Jones, a new species, are described and illustrated from collections made in Alabama.

INTRODUCTION

A continued survey of dematiaceous hyphomycetes occurring on leaf litter and decayed decorticated wood in Alabama has yielded several further novelties. Among these is a fungus having a similar conidiophore morphology to *Blastophorum* Matsushima but possessing setae around which the conidiophores are borne in loose fascicles, and a fungus which belongs to *Cylindrotrichum* Bonorden. In several respects both are unlike any taxa hitherto documented. The former is considered to be sufficiently different from *Blastophorum* to warrant the establishment of a new genus to accommodate it.

TAXONOMIC PART

Chaetoblastophorum gen. nov.

Deuteromycotina, Hyphomycetes.

(Etym. *Blastophorum* et Gr. *chaeta*, bristle)

Coloniae late effusae, albidae vel brunneae, pilosae vel velutinae. Mycelium partim superficiale, partim immersum, ex hyphis ramosis, septatis, subhyalinis vel brunneis compositum. Setae rectae vel flexae, laevibus, septatae, crasse tunicatae, atro brunneae. Conidiophora macronemata, in fasciculis aggregata, erecta, recta vel

flexuosa, simplicia, laevia, atro brunnea vel pallide brunnea, sursum pallidiora, crasse tunicata, septata, apice refringentia, protrusionem fertilem formantia. Cellae conidiogenae polyblasticae, terminales, sympodiales. Conidia solitaria, acropleurogena, cylindrica, continua, hyalina, laevia.

Species typica: *Chaetoblastophorum ingramii* Morgan-Jones.

Colonies broadly effuse, whitish to brown, hairy to velvety. Mycelium partly superficial, partly immersed, composed of branched, septate, subhyaline to brown hyphae. Setae straight or flexuous, smooth, septate, thick-walled, dark brown. Conidiophores macronematous, aggregated in fascicles, erect, straight or flexuous, simple, smooth, dark brown to pale brown, upper part lighter, apex breaking open, forming a protruding fertile part. Conidiogenous cells polyblastic, terminal, sympodial. Conidia solitary, acropleurogenous, cylindrical, continuous, hyaline, smooth.

Chaetoblastophorum ingramii sp. nov. (Fig. 1)

Coloniae late effusae, albidae vel brunneae, pilosae vel velutinae. Mycelium partim superficiale, partim immersum, ex hyphis ramosis, septatis, subhyalinis vel brunneis, laevibus, 1.5 - 2μ crassis compositum. Setae rectae, interdum flexae, simplices, crasse tunicatae, laevibus, septatae, brunneae vel atro brunneae, acuminatae, ad apiceum obtusum vel acutum, 140 - 200 X 4 - 5μ. Conidiophora macronemata, gregaria, in fasciculis aggregata, cum setis consociata, erecta, recta vel flexuosa, simplicia, laevia, atro brunnea vel pallide brunnea, sursum pallidiora, crasse tunicata, septata, apice refringentia, protrusionem fertilem formantia, 65 - 90 X 3 - 4μ. Cellae conidiogenae polyblasticae, terminales, sympodiales. Conidia solitaria, acropleurogena, cylindrica, continua, hyalina, laevia, cum tunicis tenuibus, guttulata, apice rotundata, base truncata, in massam albidam in apice conidiophori aggregata, 11 - 13 X 2.5 - 3μ.

In foliis emortuis Quercus nigrae, Auburn University Forestry Plots, Auburn, Lee County, Alabama, April 1976, E.G. Ingram, BPI, holotypus.

The new species is named in honor of Mr. Edwin G. Ingram, who collected the leaves on which it was discovered.

Colonies broadly effuse, brown to white with the production of conidia, hairy or somewhat velvety. Mycelium partly superficial, mostly as swollen, brown, thick-walled, subglobose, up to 5μ wide cells; partly

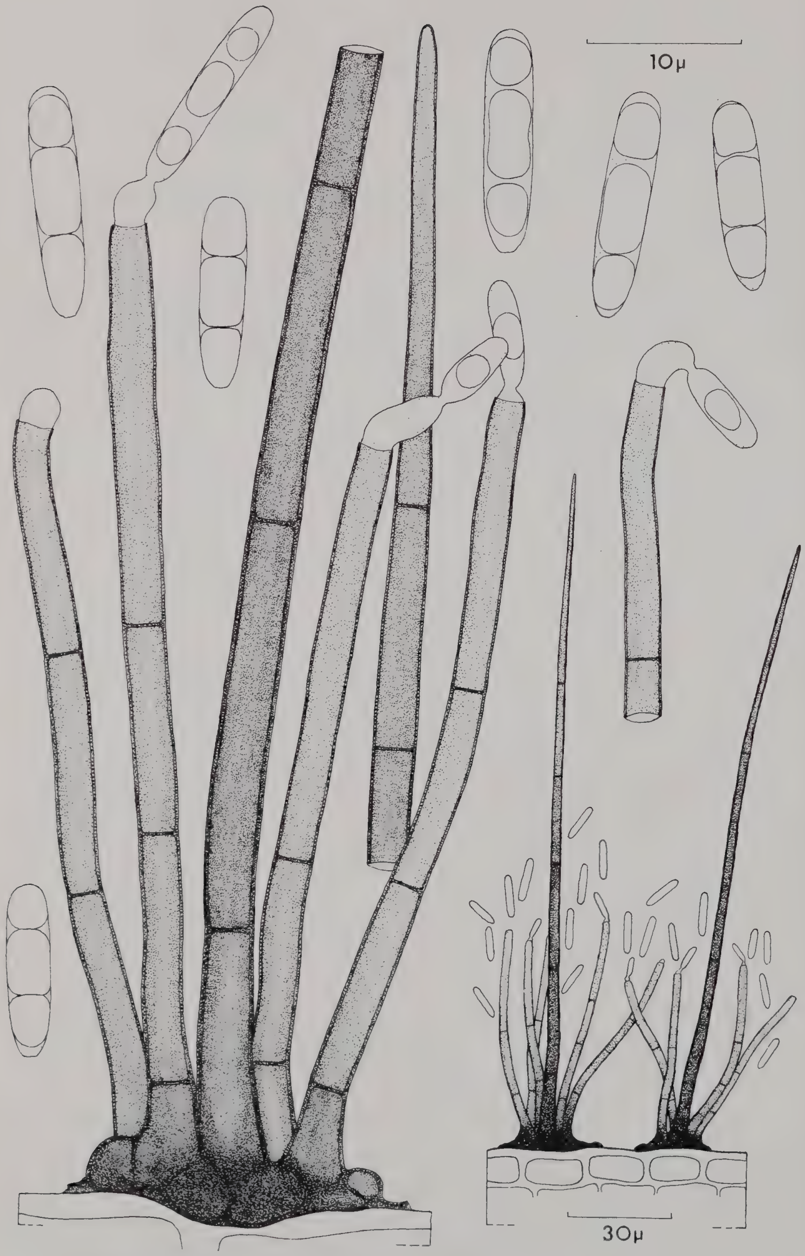

FIGURE 1. *Chaetoblastophorum ingramii.* Conidiophores and conidia.

immersed as branching, septate, cylindrical, smooth, subhyaline to very pale brown, 1.5 - 2μ wide hyphae. Setae straight, sometimes slightly flexuous, simple, thick-walled, smooth, septate, brown to dark brown, swollen slightly at the extreme base, attenuating to an obtuse or acute apex, sometimes fertile, producing conidia at the apex in the same manner as the conidiophores, 140 - 200 X 4 - 5μ arising from the swollen superficial cells as do the conidiophores. Conidiophores macronematous, mononematous, gragarious, aggregated in loose fascicles of up to five around a single seta, erect, straight or frequently flexuous, simple, smooth, dark brown at the extreme base to pale brown at the apex, thick-walled, septate, apex breaking open and proliferating percurrently forming a protruding fertile part. Conidiogenous cells integrated, terminal, hyaline, polyblastic, sympodial. Conidia solitary, acropleurogenous, cylindrical, continuous, hyaline, thin-walled, smooth, guttulate, apex rounded, base truncate to very slightly papillate, aggregating in a white mass at the apex of the conidiophores, 11 - 13 X 2.5 - 3μ.

On dead leaves of *Quercus nigra* L., North America.

Collection examined: on *Q. nigra*, Auburn University Forestry Plots, Auburn, Lee County, Alabama, April 1976, E.G. Ingram, BPI, AUA, type.

This genus is closely related to *Blastophorum*, based on *B. truncatum* Matsushima described from decayed leaves of *Castanopsis* sp., collected in Papua-New Guinea (Matsushima, 1971). Matsushima (1975) added a second species, *B. uniseptatum* Matsushima, found on leaves of *Quercus glauca* in Japan.

The conidia are produced in succession from conidiogenous loci on a thin-walled protrusion from the ruptured apical cell of the conidiophore in a manner similar to that described by Goos (1969) in *Cacumisporium capitulatum* (Corda) Hughes.

Chaetoblastophorum differs from *Blastophorum* by the possession of acuminate setae borne, together with the conidiophores, from a stromata-like aggregation of thick-walled, swollen, superficial hyphal cells.

Cylindrotrichum oblongisporum sp. nov. (Fig. 2).

Coloniae effusae, brunneae, pilosae. Mycelium partim superficiale, plerumque in substrato immersum. Conidiophora macronemata, mononemata, solitaria, erecta, simplicia, recta vel flexuosa, septata, brunnea vel pallide brunnea, apicem versus pallidiora, laevia, ex basibus bulbosis, 85 - 190 X 4 - 5μ. Phialides in

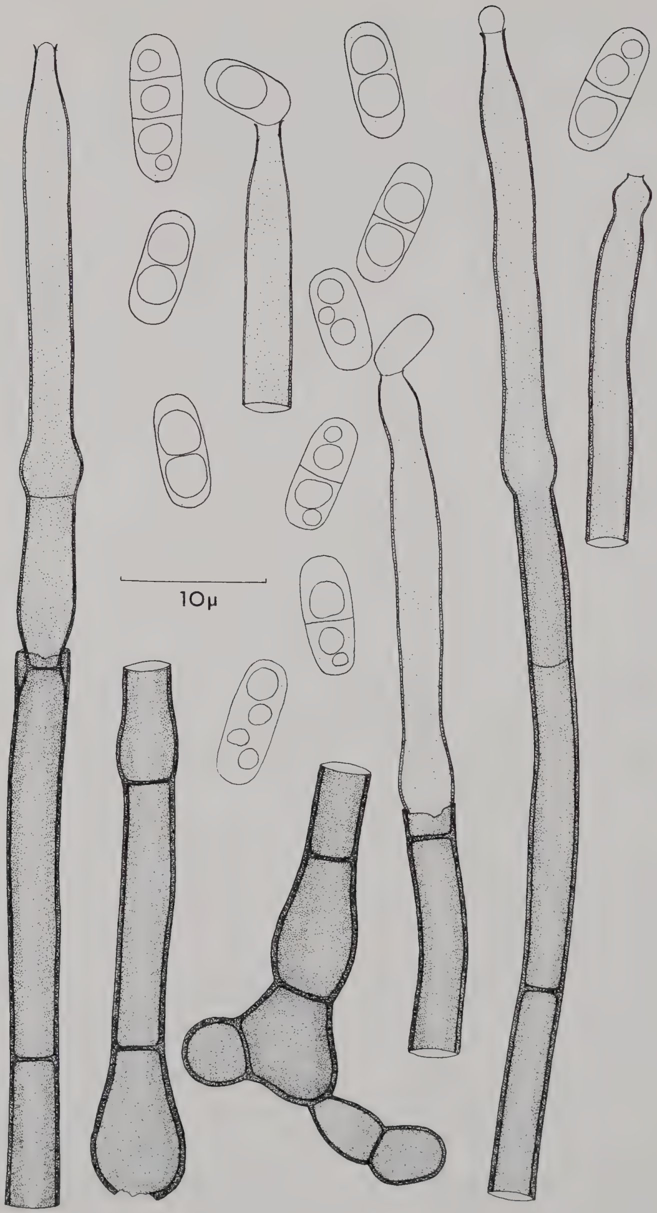

FIGURE 2. *Cylindrotrichum oblongisporum.* Conidiophores and conidia.

conidiophoris incorporatae, terminales, cylindricae. Conidia oblonga, utrinque rotundata, hyalina, laevia, 0 - 2 septata, guttulata, 6 - 7 X 2.5 - 3μ.

In ligno emortuo, Auburn University Forestry Plots, Auburn, Lee County, Alabama, April 1976, G. Morgan-Jones, BPI, holotypus.

Colonies effuse, brown, hairy. Mycelium partly superficial, mostly as swollen, pale brown to brown, thick-walled, up to 4.5μ wide hyphal cells; mostly immersed as branched, cylindrical, smooth, septate, subhyaline to pale brown, 2 - 3.5μ wide hyphae. Conidiophores macronematous, mononematous, solitary, erect, simple, straight or slightly flexuous, septate, proliferating percurrently and frequently nodose, brown to pale brown, paler towards the apex, 85 - 190 X 4 - 5μ, up to 6.5μ wide at the nodes, attenuating, sometimes sharply, towards the 1.5 - 2μ wide apex which bears a minute collarette, up to 8 wide at a bulbous base. Conidiogenous cells monophialidic, integrated, terminal. Conidia oblong, rounded at the ends, hyaline, guttulate, smooth, 0 to 2-septate, 6 - 7 X 2.5 - 3μ, obliquely borne at the apex.

On dead wood; North America.

Collection examined: on dead wood, Auburn University Forestry Plots, Auburn, Lee County, Alabama, April 1976, G. Morgan-Jones, BPI, AUA, type.

C. oblongisporum differs from *Cylindrotrichum oligospermum* (Corda) Bonorden, the type species of *Cylindrotrichum* Bonorden, in lacking polyphialidic, sympodial conidiogenous cells. In respect of its conidiogenous cells being monophialidic it resembles *Cylindrotrichum triseptatum* Matsushima. A third species, *Cylindrotrichum proliferum* Matsushima, possesses percurrently proliferating phialides. The conidia of *C. oblongisporum* are much shorter than those of *C. proliferum* and considerably shorter than those of *C. oligospermum* and *C. triseptatum*. The fungus on which the name *Cylindrotrichum triseptatum* M.B. Ellis is based is also closely similar in respect of its monophialidic conidiogenous cells. Its longer, cylindrical, three-septate conidia serve to distinguish it from *C. oblongisporum* however. *C. triseptatum* M.B. Ellis constitutes a later nomenclatural homonym of *C. triseptatum* Matsushima. The two fungi which these names are applied to are congeneric but not conspecific. The conidia of Matsushima's fungus are appreciably larger and have a protuberant, narrow, somewhat truncate base. A new name is therefore required for *C. triseptatum* M.B. Ellis and is herein proposed.

Cylindrotrichum ellisii Morgan-Jones nom. nov.

≡ *Cylindrotrichum triseptatum* M.B. Ellis, More Dematiaceous Hyphomycetes, 470, 1976.

Non *Cylindrotrichum triseptatum* Matsushima, Icones Microfungorum a Matsushima Lectorum, 48, 1975.

ACKNOWLEDGMENTS

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MYCOTAXON

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NOTICE

IMA NOMENCLATURE COMMITTEE ANNOUNCEMENT AND IMC^2

Members of the International Mycological Association's Nomenclature Committee are currently assigned to one or more of six subcommittees wrestling with particular problems. Anyone who wishes to contribute to their deliberations may contact any member, or the Secretary of that subcommittee. For problems not assigned to an existing subcommittee, contact any member of the Secretariat. Meetings of each subcommittee and of the whole IMA Nomenclature Committee will be held during the Second International Mycological Congress, August 27th to September 3, 1977 at the University of South Florida, Tampa, Florida. All these meetings are open to anyone interested. A new Secretariat to serve until IMC^3 will be elected during those meetings.

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A NEW SPECIES OF EUPENICILLIUM FROM JAPANESE SOIL

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During the course of a 1972 survey of soil ascomycetes, a previously undescribed Eupenicillium was encountered from a soil sample collected in Itsukaichi's copse, one of the suburban areas of Tokyo. From a peculiar pattern of ornamentation in its ascospores, it is described here as E. lineolatum sp. nov.

Specimens cited are deposited as follows: No. 2776 (holotype) in the Mycological Herbarium, National Institute of Hygienic Sciences (NHL), Tokyo, Japan, and No. 4536 (isotype) in the Mycological Herbarium, Research Institute for Chemobiodynamics (IFM), Chiba University, Narashino-shi, Chiba, Japan.

Eupenicillium lineolatum Udagawa & Horie sp.nov. (Figs. 1-2)

Status conidialis: Penicillium lineolatum Udagawa & Horie st.nov.

Coloniae in agaro Czapekii celeriter crescentes, tenues et pro maxima parte submersae; cleistothecia plerumque absentia; in agaro maltoso vel agaro farina avenae mixto effusae, planae, tenues, granulares, cleistotheciis abunde productis, sulphureae ad primulinae; fructificationes conidiorum limitatae; reversum incoloratum vel stramineum.

Cleistothecia dispersa vel confluentia, superficialia, sulphurea vel aliquantum flavo-brunnea, globosa vel subglobosa vel plus minusve elongata, 65-130(-160) μm diam, vulgo hyphis flavis laxe intricatis circumdata; peridium primo sclerotioideum, deinde tenue et membranaceum. Asci octospori, singuli, terminales et laterales e hyphis ascogenis oriundi, primo obovoidei vel oblongi, deinde subglobosi vel ellipsoidei, 8-11.5 × 6-8 μm, postremo evanescentes. Ascosporae hyalinae, subglobosae vel late ellipsoideae, 3.0-4.0 × (2.5-)3.0-3.5 μm, leves apparentes sed sub 'SEM' lineolatae.

Status conidialis abundans in agaro cellulosa mixto. Conidiophora plerumque ex hyphis repentibus et ramosis enata, hyalina, 30-150 × 2.0-3.0 μm, septata, levia. Penicilli plerumque monoverticillati, sed interdum 1-2-ramos

12-30 μm longos gerentes. Phialides ad 8(-10) per verticillum, circa 9-12 × 2.5-3.0 μm, apicem versus angustatae. Conidia hyalina, ellipsoidea, (2.5-)3.0-4.0 × 2.0-3.5 μm, levia, catenata.

Typus No. 2776, NHL, isolatus e solo sylvae in Japonia.

Colonies on Czapek agar growing rapidly, thin, consisting of a spreading, submerged vegetative mycelium, with scanty growth of aerial hyphae, suggesting some type of nutrient deficiency; cleistothecia and conidial structures usually lacking.

Colonies on malt agar or oatmeal agar spreading broadly, plane, thin, with surface granular in appearance, quickly developing a dense layer of numerous cleistothecia which obscured loosely by aerial hyphae, sulphur yellow to slightly greenish yellow (Rayner 25f, 25); conidial structures limited and not affecting the colony appearance; reverse uncolored to straw yellow (Rayner 21'd).

Cleistothecia scattered or confluent in small groups, superficial, yellow to somewhat yellowish brown, globose to subglobose or slightly elongate, 65-130(-160) μm in diam, usually surrounded by a loose envelope of yellow encrusted hyphae; peridium at first consisting of sclerotioid masses of thick-walled, polygonal cells, becoming thin and membranaceous in age. Ascus formation rather quick outwards from the center within 10-14 days. Asci 8-spored, borne singly as short, terminal and lateral branches from ascogenous hyphae, at first obovoid or oblong, then becoming subglobose to ellipsoidal, 8-11.5 × 6-8 μm, evanescent at maturity. Ascospores hyaline, subglobose to broadly elliptical, 3.0-4.0 × (2.5-)3.0-3.5 μm, with walls superficially smooth but lineolate when viewed with SEM (Fig.2).

Conidial structures developed abundantly on cellulose agar and cornmeal agar. Conidiophores usually arising from trailing and branching hyphae, hyaline, 30-150 × 2.0-3.0 μm, septate, smooth-walled. Penicilli mostly monoverticillate but sometimes showing a few branch or secondary prolongation on the same conidiophore, producing tangled to loosely columnar chains of conidia up to 145-160 μm in length. Branches, when present, 12-30 μm in length. Phialides usually in small clusters up to 8(-10) in number, mostly 9-12 × 2.5-3.0 μm, tapering to fairly long conidium-bearing tips. Conidia hyaline, elliptical, with ends more or less pointed, variable in dimensions, (2.5-)3.0-4.0 × 2.0-3.5 μm, smooth-walled.

At 37 C, growth-rate slightly less than at 25 C, with reduced maturation of cleistothecia.

Holotype - No. 2776, NHL, isolated from soil sample in copse near Itsukaichi-machi, Nishitama-gun, Tokyo, Japan, August 11, 1972. Isotype - No. 4536, IFM.

Etymology - The epithet, lineolatum, refers to ascospore ornamentation.

This species is characterized by its luxuriant growth on usual nutrient agar such as malt and oatmeal, the sulphur yellow colonies, the subglobose-broadly elliptical

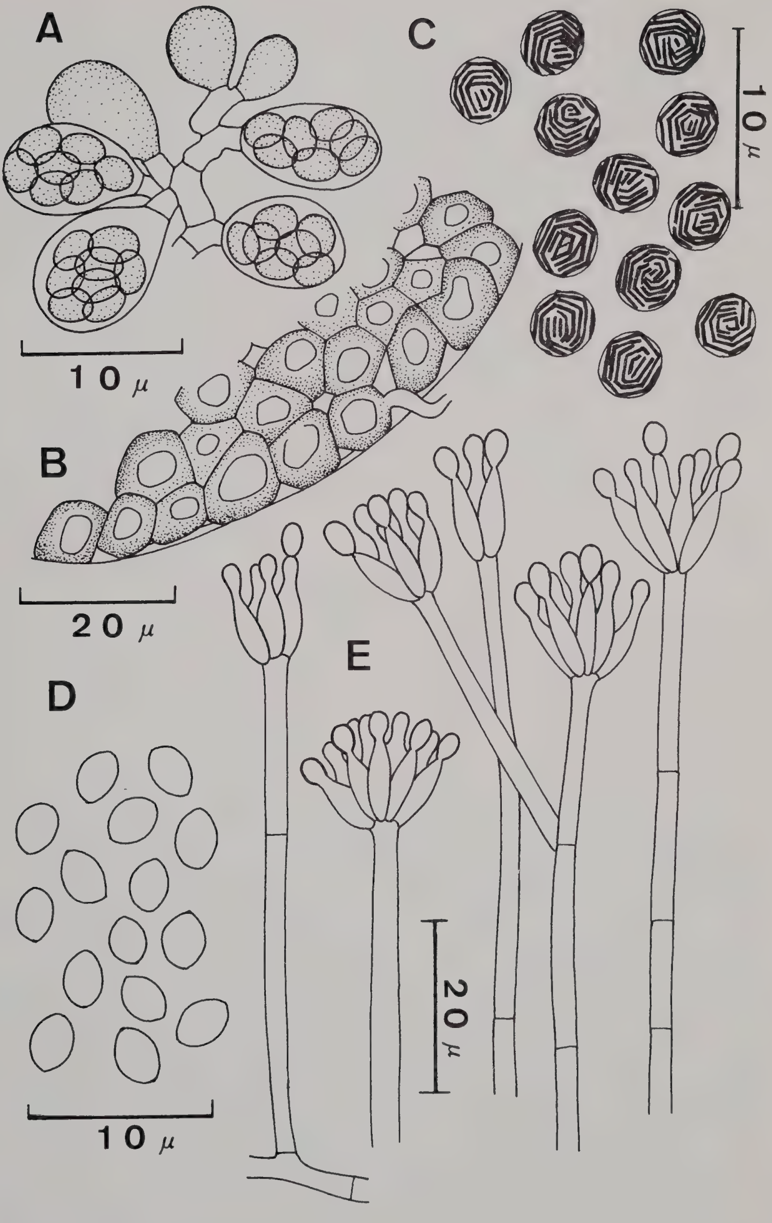
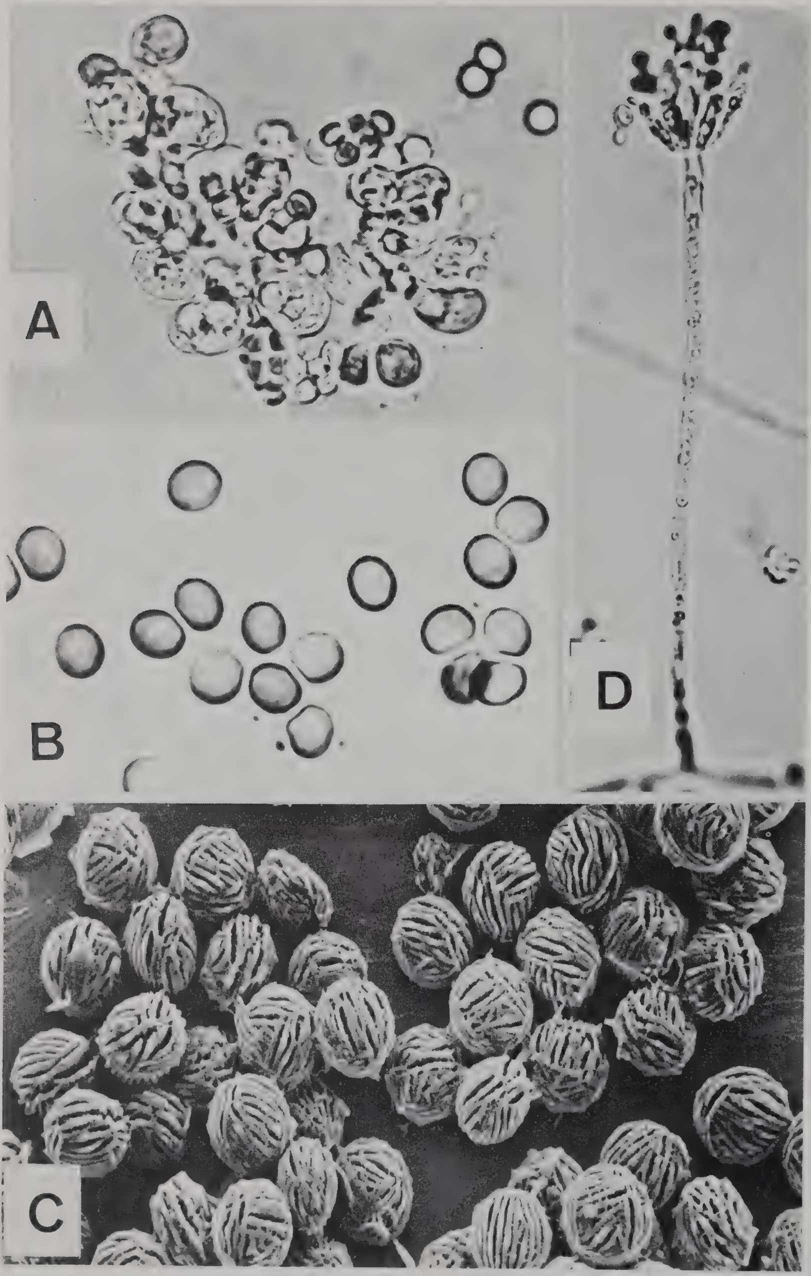

A
10 μ
B
20 μ
C
10 μ
D
10 μ
E
20 μ

Figure 1. Eupenicillium lineolatum. A. Asci in clusters. B. Part of the wall of a cleistothecium. C. Ascospores. D. Conidia. E. Penicilli.


A
B
D
C

ascospores with lineolate surface, and the monoverticillate penicilli. Although the lineolate ornamentation of its ascospores is quite striking in appearance and makes the species readily distinguishable, the production of yellow pigmented hyphae in the colony aspect is reminiscent of that of _E_. _abidjanum_ Stolk (Stolk, 1968; Scott, 1968) or even _E_. _ehrlichii_ (Klebahn) Stolk & Scott (Stolk & Scott, 1967; Scott, 1968). However, it differs morphologically from the latter two species. Pulley-shaped ascospores with two equatorial crests are never produced in _E_. _lineolatum_.

_E_. _levitum_ (Raper & Fennell) Stolk & Scott (1967) is also a similar species in having subglobose-broadly elliptical ascospores without any indication of an equatorial furrow or crests. Besides the ascospore ornamentation, it differs from _E_. _lineolatum_ principally in the appearance and texture of colonies on Czapek agar, its sparse conidium formation on cornmeal agar, its larger ascospores, and its fragmentary penicilli.

From the resemblance in the general patterns of the penicilli, the conidial state of _E_. _lineolatum_ should be placed in the _Penicillium decumbens_ series of the Monoverticillata (Raper & Thom, 1949).

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Figure 2. _Eupenicillium lineolatum_. A. Asci in various stages of development. × 1000. B. Light micrograph of ascospores, showing superficially smooth walls. × 1750. C. Scanning electron micrograph of ascospores. × ca.3500. D. Conidiophore. × 1000.

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AN ANNOTATED INDEX FOR BOLTON'S "HISTORY OF FUNGUSSES."

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ABSTRACT

Bolton's status as name-giver is discussed, an index provided to his major publication, and the consequences of starting point change on his names explained.

James Bolton (1758-1799), thought to be a teacher of art (Ainsworth, 1976), produced a three-volume publication popularly titled "An history of fungusses, growing about Halifax" (for full bibliographic data, see "Literature cited" below). In it, 182 plates, all in color, illustrated fungi, and apparently were executed either from Bolton's own drawings, or directly on the copper plates from fresh material. The series was the subject of later taxonomic commentary (Sartory & Maire, 1920*, La Planche, 1894), but very little else has been forthcoming concerning Bolton's life, associations and impact.

While tracing fungus epithets to their pre-starting point origins, I became intrigued with Bolton's style, chiefly based on the index provided by him to his publication. Although not explicitly stated, a quick look at his names (*"nomina trivialia"*) revealed that the great majority were new, coined by him. A bit more investigating disclosed that his "protologue" included older names for the same fungi, discarded by Bolton in favor of names of his own choosing. Moreover, several of Bolton's names were clearly homonymic, but Bolton's citations avoided these prior names, and hence Bolton's name, with no clues to the contrary, must be taken as new. For example, Bolton's

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*I have seen two citations to this work, one as stated after this paper, taken from the Krieger catalog of the mycological library of H. A. Kelly, the other in my own files written on a card as follows: "Sartory & Maire. 1919. 'On Bolton's history of fungusses Vol. I & II (1788),' Paris, E. le Framois." I no longer know the source of this second citation.

Agaricus muscarius cannot be confused with the popular binomial of Linnaeus, passed on to the starting point literature, for Bolton never mentions Linnaeus, and avoids reference to this epithet even by Schaeffer.

The literature cited by Bolton may be divided into two bodies. Firstly, there is the literature which employed phrase names, or polynomials, including the works of Micheli, Sterbeeck, Vaillant, early "Flora Danica" fascicles, Battarra, etc. Because these names are inadmissible, they are not considered as names in my notes presented below. Secondly, the publications of Bulliard and Schaeffer produced the lion's share of binomial names cited by Bolton, with later "Flora Danica" fascicles, Batsch, Hoffmann, and a few others also cited. But the publications by Haller, Curtis, Linnaeus, Scopoli, Hudson, Jacquin, Relhan and others are either hardly mentioned, or totally ignored. The result is a narrow perception of the literature, onto which is imposed Bolton's penchant for coining new names in place of old.

Nevertheless, in almost every instance where Bolton knew of other illustrations or descriptions of the "same" fungus, a preferred former name is stated and a protologue provided. Additional references to authors and plates were also mentioned, but without a fungus name, more than likely indicating that one name was preferred, the others dismissed.

Bolton's influence on later literature was sizable. Not less than 48 Bolton names were adopted specifically in 1821 (cf. Petersen, 1975a, etc.) and surely others later. Of the names which survived through the starting point, not less than 39 must be considered superfluous to names already in the literature, considered synonymous by Bolton himself. With the chance that the starting point for *Fungi caeteri* may presently be changed to 1753 (*Species plantarum* of Linnaeus), all 39 would be replaced by prior names, instead of surviving in their validated post-starting point state.

The text which accompanied the plates was often nearly irrelevant for descriptive purposes, instead narrating the location and name of the collector, and other non-morphological data. Whether or not the text can serve as "valid" description must be taken on an individual basis, presumably by modern monographers, but such considerations present additional problems to the proponents of early starting point. The text pages were not numbered, but the sequence of pagination and numbers of fungi strictly adhere to the sequence and contents of the plates, so the description is most popularly stated as, eg. "Plate 40 + accompanying text," or even as "p. 40, pl. 40." The latter can be accepted, for the introductory pages are separately paginated and render the total pagination in phase with the plates. Plates are cited below for accuracy only.

The information supplied in the index below is as follows. Firstly, the "*nomen triviale*" used by Bolton is at the left hand, alphabetically by genus; secondly, the plate number (and therefore page number) on which that fungus appears; thirdly, the origin of Bolton's epithet. New species are of two sorts: a) apparently truly new species, designated as sp. nov.; and b) new names for organisms with prior but inadmissible (polynomial) names, designated "sp. nov." The designation nom. nov. indicates the Bolton's name supplants a prior, admissible name. When *Bolton's* epithet was adopted in 1821 by a validating author(s), a separate note appears after the index itself. When Bolton himself directs the reader to a prior identical name, the original reference to that name is supplied, and when, in fact, the name originated even earlier, the true origin is indicated by one or more arrows. Literature abbreviations may be found in Petersen (1975a, etc.). Finally, when Bolton ignores reference to obviously homonymic prior names, the complete reference is given as "nom. nov. (non Sch 4: 68)" indicating Schaeffer's prior use of an identical name before Bolton.

The notes are keyed within the index, and provide the following data: a) the 1821 author who adopted *Bolton's* epithet (eg. G: 634 = Gray, p. 634: abbreviations from Petersen, 1975a); b) the prior name of choice cited by Bolton, and its true origin (eg. *A. sessilis* BH: 383 = *Agaricus sessilis* is earlier admissible name of choice cited by Bolton himself, originated by Bulliard, p. 383).

INDEX TO BOLTON'S "HISTORY OF FUNGUSSES."

Epithet	*Plate no.*	*Origin*	*Notes*
		AGARICUS	
acris	60	nom. nov.	1
adscendens	55	nom. nov.	
albus	153	nom. nov. (non Sch 4: 68)	
alumnus	155	nom. nov.	
amethystinus	63	nom. nov. (non HFA: 612)	
androsaceus	32	Sch 4: 60 LSP: 1176	
annulatus	23	nom. nov.	
aquosus	71	"sp. nov." (non "BH: 470")	
atro-albus	137	sp. nov.	
atro-rufus	51	Sch 4: 58	
betulinus	72	nom. nov. (non LSpPl: 1645)	
bulbosus	147	nom. nov. (non Sch 4: 61)	
caeruleus	12	"sp. nov."	
campanulatus	31	nom. nov. (non Sch 4: 28 ← LSP: 1175)	
campestris	45	Sch 4: 16 ← Scop: 425 ← LSP: 1173	
candidus	39	nom. nov. (non Sch 4: 54/ BEFC 1: 133)	
carnosus	146	nom. nov.	
castaneus	10	nom. nov. (non BH: 658)	
cespitosus	41	nom. nov.	
chanterellus	62	BH: 505 ← LSP: 1171 "chantarellus"	
ciliaris	53	nom. nov.	2
cinctulus	152	nom. nov.	3
cinnamomeus	150	nom. nov. (non LSP: 1173)	
clavus	39	BH: 541 ← Sch 4: 26 ← LSP: 1175	
clypiatus	57	nom. nov. (non LSP: 1174)	
concinnus	15	nom. nov.	
confertis	18	nom. nov.	4
congregatus	140	nom. nov.	
coriaceus	158	BH: 373	

cornucopioides	8	nom. nov	5
cristatus	7	nom. nov.	6
croceus	51 fig. 2	"nom. nov."	7
cuspidatus	66 fig. 2	nom. nov.	8
cyathoides	145	"BH" nom. nov.	9
cyaneus	143	BH: 641	
deliciosus	9	nom. nov. (non Sch 4: 7 ← Scop: 451)	
denticulatus	4	nom. nov.	10
domesticus	26	nom. nov.	11
durus	67 fig. 1	nom. nov.	
eburneus	4 fig. 2	BH: 524	
elasticus	16	nom. nov.	
elephantinus	28	nom. nov.	12
equestris	65	nom. nov. (non LSpPl: 1642)	
extinctorius	24	BH: 408	
farinaceus	64	nom. nov. (non HFA: 616)	13
fascicularis	29	nom. nov.	14
fimbriatus	61	nom. nov.	15
fimitarius	44	nom. nov.	
fissus	35	nom. nov.	
flabelliformis	157	Sch 4: 20	
flabellatus	72	nom. nov.	16
flavidus	149	Sch 4: 17	
flavus	56	nom. nov.	
fusco-pallidus	136	"sp. nov."	
infundibuliformis	34	nom. nov. (non Sch 4: 49)	17
integer	1	nom. nov. (non LSP: 1171)	
irregularis	13	nom. nov.	
laceratus	68	nom. nov.	
lactifluus	3	Sch 4: 3 ← LSP: 1172	
laricinus	19	nom. nov.	
lateralis	71	sp. nov. (non Sch 4: 31)	
latus	2	nom. nov.	
luridus	25	nom. nov. (non Sch 4: 30)	
luteo-albus	38 fig. 1	nom. nov. (as "lateo-albus")	18

luteus	50	sp. nov. (non HFA: 611)	
mammosus	69	nom. nov. (non LSP: 1174)	
melleus	141	nom. nov. (non Sch 4: 20)	
membranaceus	11	nom. nov.	
mollis	40	nom. nov. (non Sch 4: 49)	
muscarius	27	nom. nov. (non Sch 4: 13 ← LSP: 1172)	
myodes	139	Sch 4: 69	
nobilis	46	nom. nov.	
nuceus	70	nom. nov.	
oblectus	142	nom. nov.	19
oreades	151	nom. nov.	20
peronatus	58	nom. nov.	21
piperatus	21	BH: 601	
planus	72 fig. 3	nom. nov.	
plumosus	33	"sp. nov."	
politus	30	nom. nov.	
pompatus	5	nom. nov.	
procerus	37	nom. nov. (non Sch 4: 12 ← Scop: 418)	
pseudo-clypiatus	154	sp. nov.	
pseudo-cinnamoneus	22	nom. nov.	
pullatus	20	nom. nov.	22
pulvinatus	49	nom. nov.	
purpureus	41B	nom. nov. (non Sch 4: 67)	
quercinus	73	Sch 4: 57 ← Scop: 459	
radiatus	39C	nom. nov.	
ramosoradiatus	148	"sp. nov."	
repandus	6	nom. nov. (non BH: 586)	
rigidus	43	nom. nov.	
rubeus	36	nom. nov.	
serratus	14	nom. nov.	
sordidus	59	Dick 1: 16	
striatus	54	nom. nov. (non Sch 4: 18/BH: 433)	
tomentosus	156	BH: 402	
tortilis	41A	nom. nov.	23
trilobus	38	nom. nov.	

umbelliferus	39A	Sch 4: 73 ← LSP: 1175	
umbilicatus	17	Sch 4: 46 ← Scop: 431	
velutipes	135	nom. nov. (non CFL 4: pl. 70)	24
vernalis	48	nom. nov.	
verrucosus	47	nom. nov.	
villosus	42	nom. nov.	
violaceus	52	Sch 4: 3 ← LSP: 1173	
zonarius	144	nom. nov.	26

BOLETUS

albus	78	nom. nov. (non Sch 4: 92)	
annularius	169	BH: 316	
auriformis	82	nom. nov. (et comb. nov.)	
betulinus	160	BH: 348 ← GSN: 1436	
bovinus	85	nom. nov. (non LSP: 1178)	
calceolus	168	BH: 338	
elegans	76	nom. nov.	
hepaticus	79	"BH: 314" ← Sch 4: 82	
heteroclitus	164	nom. nov.	27
hispidus	161	BH: 351	
igniarius	80	BH: 361 ← LSP: 1176	
lacrymans	167 fig. 1	WJ 1: 111	
lateralis	83	nom. nov.	28
luteus	84	nom. nov. (non LSP: 1177)	
medulla-panis	167 fig. 2	WJ 1: 141	
obliquus	74	sp. nov.	
procerus	86	nom. nov.	
proteus	166	nom. nov.	
rangiferinus	138	"Blacks. Spec. Bot. pl. 1"	
resupinatus	165	sp. nov.	
squamosus	77	nom. nov. (non HFA: 626)	
suberosus	162	BH: 354	

substrictus	170	sp. nov.
subtomentosus	87	nom. nov. (non LSpPl: 1647)
tenax	75	nom. nov.
unicolor	163	BH: 365
versicolor	81	Sch 4: 88 ← LSP: 1176

CLATHRUS[29]

denudatus	93 fig. 2	nom. nov.
flavus	93 fig. 4	nom. nov.
fulvus	93 fig. 3	nom. nov.
nudus	93 fig. 1	nom. nov.
olivaceus	94 fig. 2	nom. nov.
sphaerocephalus	94 fig. 1	"sp. nov."
turbinatus	94 fig. 3	nom. nov.

CLAVARIA

coralloides	113	BH: 201 ← LSP: 1182
elegans	115	nom. nov.
fastigiata	112 fig. 2	"BH: 203†" ← LSpPl: 1652
gracilis	111	sp. nov.
gyrans	112 fig. 1	nom. nov. (non BEFC 1: 235)
muscoides	114	BH: 203 ← LSP: 1183
ophioglossoides	111 fig. 2	Sch 4: 123 ← LSP: 1182
pistillaris	110	Sch 4: 115 ← LSP: 1182

HELVELLA

agariciformia	98 fig. 1	sp. nov.
aurea	98 fig. 2	sp. nov. (non Relh: 1244)
cartilaginea	101	nom. nov.
caryophyllaea	173	Sch 4: 115/ BH: 284 (Auricularia)

coccinea	100	Sch 4: 100/ BH: 269 (Peziza)
feritoria	97	nom. nov.
fibulaeformia	176	sp. nov.
hispida	96	Sch 4: 108 (non HFA: 635)
membranacea	177	nom. nov.
mesenterica	172	nom. nov. (non Sch 4: 108)
mitra	95	Sch 4: 105 ← LSP: 1180
nicotiana	174	sp. nov.
sarcoides	101	nom. nov. (non Dick 1: 21)
vesciculosa	175	BH: 270

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HYDNUM

auriscalpium	90	Sch 4: 96 ← LSP: 1178
imbricatum	88	"sp. nov." (non LSP: 1178)
minimum	171	sp. nov.
repandum	89	BH: 311 ← LSP: 1647

LYCOPERDON[36]

bovista	117	BH: 154
cervinum	116	nom. nov.
epidendrum	119 fig. 1	BH: 145
globosum	118	"sp. nov."
gossypinum	178	nom. nov.
stellatum	179	BH: 160

MUCOR

botrytis	132 fig. 3	nom. nov.
cespitosus	132 fig. 2	nom. nov.

lycogalus	133 fig. 2	nom. nov.
mucedo	132 fig. 1	nom. nov. (non LSP: 1185)
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septicus	134	nom. nov.
urceolatus	133 fig. 1	Dick 1: 25

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auricula	107	nom. nov. (non Elvela ~ Sch 4: 103 ← LSP: 1157)	
coccinea	104	nom. nov. (non Elvela ~ Sch 4: 100)	
coerulia	108 fig. 2	nom. nov.	32
cornucopioides	8	BH: 291 LSP: 1181	
fusca	109 fig. 2	sp. nov.	
inflecta	106 fig. 2	nom. nov.	33
lentifera	102 fig. 1	nom. nov. (non BH: 166)	
ochroleuca	105 fig. 1	nom. nov. (non Elvela ~ Sch 4: 109)	34
scutellata	108 fig. 1	nom. nov. (non Elvela ~ Sch 4: 101 ← LSP: 1651)	
striata	102 fig. 2	BH: 166 (Nidularia)	
tuba	106 fig. 1	"sp. nov."	
undulata	105 fig. 2	nom. nov.	
viridis	109 fig. 1	"BH: 252†"	

PHALLUS

esculentus	91	Sch 4: 135 ← LSP: 1178
impudicus	92	Sch 4: 134 ← LSP: 1179

SPHAERIA

agariciformia	130	"sp. nov."
bombardica	122	nom. nov. (non BEFC 1: 271)

brassicae	119 (as 199)	"Gleichen Suppl. t. 6" (Dick 1: 23)	
concentrica	180	"sp. nov."	
digitata	129	BH: 192 ← LSpPl: 1652 (Clavaria)	
depressa	122	nom. nov.	37
foliacea	131	nom. nov.	
glauca	121	nom. nov.	
maxima	181	nom. nov.	
militaris	128	"sp. nov." (non LSP: 1182, Clavaria)	
miniata	127	nom. nov.	
mori	120	nom. nov. (non RelS 2: 31)	
obducta	125	nom. nov.	
pertusa	126	"Dill[wyn] musc. t. 18, fig. 9"	
riccioidea	182	sp. nov.	
rugosa	123 fig. 2	sp. nov.	
sanguinea	121 fig. 1	nom. nov.	38
sulcata	124	sp. nov.	
truncata	127 fig. 2	nom. nov.	
tuberculosa	123 fig. 1	"Dill[wyn] musc. t. 18, fig. 7"	
viridis	121 fig. 2	sp. nov.	

NOTES ON THE INDEX

1. Fr: 65 - new name for A. spadiceus Sch 4: 27.
2. G: 633 (Coprinus) - new name for A. atromentarius BH: 413.
3. P: 229 - new name for A. leoninus Sch 4: 21.
4. G: 631 (Prunulus) - new name for A. digitaliformis BH: 435.
5. P: 189 - new name for A. mutabilis Sch 4: 6 Scop: 440.
6. Fr: 22 - new name for A. sylvaticus Sch 4: 62.
7. P: 197 - new name for A. ochraceus BH: 644 (cited as "ocraceus" by Bolton).
8. G: 631 (Prunulus gracilis var. ∽) - new name for A. foraminulosus BH: 460.
9. G: 614 (Omphalia) - although there is an apparant prior name, Bolton miscited it.
10. G: 630 (Prunulus) - new name for A. amethysteus BH: 559 (cited as "amethystinus" by Bolton).
11. Fr: 311 - new name for A. fuscescens Sch 4: 10.
12. P: 203, H: 20 - new name for A. cinerascens BH: 598.
13. P: 214, H: 22 - new name for A. fasciatus Sch 4: 53.
14. Fr: 288 - new name for A. pulverulentus BH: 478†.
15. Fr: 94 - new name for A. infundibuliformis BH: 510.
16. P: 239 - new name for A. sessilis BH: 383.
17. P: 393 - although there is a prior name, Bolton miscited it.
18. P: 238 - new name for A. pumilis BH: 452.
19. G: 634 (Coprinus) - new name for A. fugax Sch 4: 30.
20. Fr: 127 - new name for A. pseudo-mouceron BH: 578.
21. Fr: 126 - new name for A. alliaceus BH: 551.
22. G: 634 (Coprinus cinereus [var.]∽) - new name for A. cinereus BH: 398†.
23. G: 613 - new name for A. truncorum Sch 4: 4 Scop: 426.
24. Fr: 119 - new name for A. nigripes BH: 476.
25. G: 617 - new name for A. tubaeformis Sch 4: 65.
26. G: 624 - new name for A. deliciosus Sch 4: 7 Scop: 451.
27. P: 244, G: 640 - new name for B. aurantius Sch 4: 79.
28. P: 437, M: 43, N&B: 336 - new name for B. nummularius BH: 335.
29. Starting date not considered as 1821: no data for validation in this genus.
30. G: 664 (Patellaria) - the improbable prior name cited by Bolton is Lycoperdon papillatum Sch 4: 127.
31. Schl: 60 (Thelephora) - new name for Auricularia tremelloides BH: 278.
32. G: 665 - new name for P. stercoraria BH: 256.
33. P: 458 - new name for P. coronata BH: 251.
34. P: 458 - new name for P. coriacea BH: 258.
35. P: 269 (Clavaria coralloides var.∽) - new name for C. rugosa BH: 206.
36. Because the starting date for this genus is not 1821, I have no data on validation of these names.

37. P: 490, G: 515 (Peripherostoma) - new name for Variolaria punctata BH: 185.

38. LD 22: 386, Schl: 59, M: 145, P: 279, G: 526 - new name for Hypoxylon phoenicium BH: 171.

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MYCOTAXON

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ASCOSPORE GUTTULATION IN TRICHOPHAEOPSIS BICUSPIS AND IN ITS SUBSPECIES, TRICHOPHAEA EGUTTULISPORA

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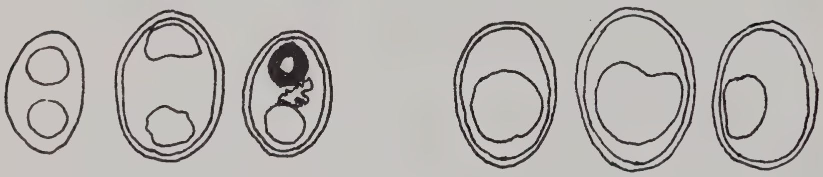
The presence of one or more refractive guttules in ascospores, consisting of an oleaginous material that absorbs oil stains such as Sudan IV, is not uncommon in operculate discomycetes. The genus *Trichophaea* was erected by Boudier (1885) for certain setose operculate discomycetes with ascospores containing one or two such oleaginous guttules. In the same publication Boudier erected *Tricharia* for similar species with eguttulate ascospores (that name being a later homonym, it has now been replaced by *Tricharina* Eckbl.). Gamundí (1966) synonymized the two genera and transferred both of the species mentioned by Boudier when he erected *Tricharia* to *Trichophaea*, having concluded that ascospore guttulation was not an acceptable generic character in this group. Other authors (Dennis, 1968; Eckblad, 1968; Le Gal, 1969; Korf, 1972, 1973; Rifai, 1968; Svrček, 1974) have failed to follow Gamundí's lead, and all accept both genera. The apothecia of species assignable to *Tricharina* appear to be much softer and have thinner-walled, paler, and more pointed hairs than species assignable to *Trichophaea*.

One species placed by Boudier (1886, 1907) in *Trichophaea, T. bicuspis* (Boud.) Boud., differs in many characters from other species placed there, especially in the peculiar excipulum composed of vertical rows of cells which are horizontally broader than tall, and in the long, thick-walled setae with (usually) a pronounced basal prong. Some indication of guttule-like, but non-oleaginous, inclusions can be seen in some ascospores, their prominence varying greatly from collection to collection. The inclusions are certainly unlike those seen in other species of *Trichophaea*, as already noted by Boudier (1886) and by Grelet (1939). The inclusions do not take Sudan IV dye, and appear resinous rather than oleaginous, recalling the refringent mature spores of *Fima-*

ria. Korf and Erb (1972) erected the genus *Trichophaeopsis* for this anomalous species, pointing out that in addition to resinous inclusions, there may also occur gas vacuoles (de Bary bubbles) in some spores in some collections (FIG. 1). Boudier's own difficulty in reconciling the inclusions in the ascospores of this species with the oil guttules of *Trichophaea* is attested by the packet label of a presumed paratype specimen in his herbarium, where he terms it *Tricharia bicuspis,* as reported by Kanouse (1958).



FIGS. 1, 2. Ascospores, × 1000. 1. *Trichophaeopsis bicuspis* subsp. *bicuspis,* immature and mature ascospores, each with two resinous inclusions; one mature ascospore with one such inclusion, an angular, refractive body, and a de Bary bubble. (*Daams,* 5.xi.1947, R.P.K. *1532*). 2. *T. bicuspis* subsp. *eguttulispora,* three ascospores, each with a single resinous inclusion. (*Gamundí,* LPS *36891*, holotype).

Gamundí (1973) described and fully illustrated *Trichophaea eguttulispora* Gamundí from Tierra del Fuego (the description and illustrations, at a slightly greater magnification, were repeated in her more recent treatment [Gamundí, 1975]). She considered her species close to *T. bicuspis,* and did not accept the genus *Trichophaeopsis.* Her choice of an epithet was based on her decision that the ascospores of her species are devoid of guttules, whereas those of *T. bicuspis* are biguttulate. My examination of the holotype specimen of *Trichophaea eguttulispora* (LPS 36891) confirms the excellence of her description and illustrations. In one respect, however, my findings are at variance with hers. While mounts in Melzer's Reagent or in lactic acid cotton blue do not readily display any internal guttulation, mounts in KOH-phloxine-glycerine (FIG. 2) show that the mature ascospores have a large, non-oleaginous, somewhat resinous appearing inclusion which fails to stain with phloxine. It is just the kind of material that puzzled Boudier (1886), Grelet (1939), and Korf and Erb (1972) in *T. bicuspis,* where it is usually found as two inclusions (FIG. 1) if distinguishable at all. Had Gamundí examined typical *T. bicuspis,* I am convinced she would have

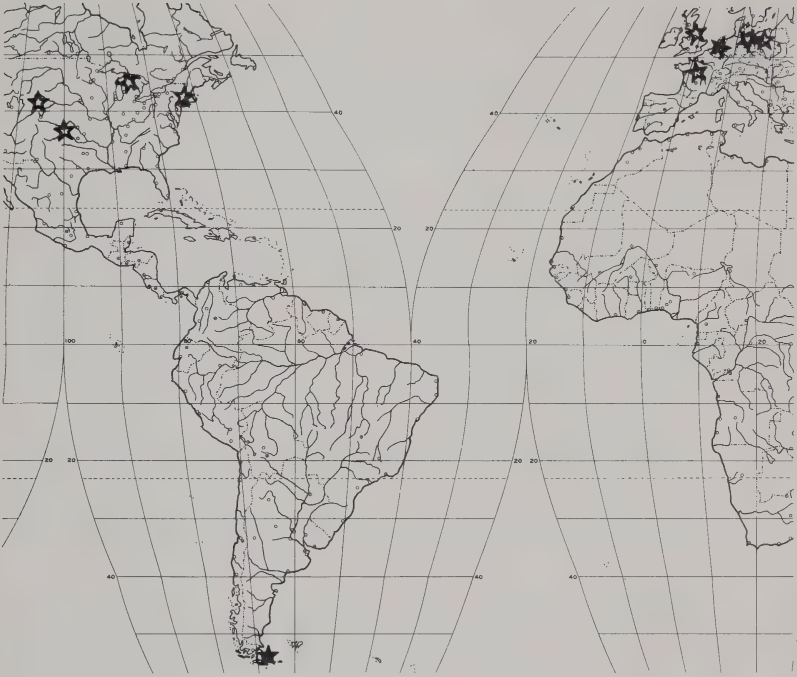


FIG. 3. Known distribution (from specimens examined by the author) of *Trichophaeopsis bicuspis*. ☆ = *T. bicuspis* subsp. *bicuspis*. ★ = *T. bicuspis* subsp. *eguttulispora*.

concluded that its spores were also eguttulate, just as did Kanouse (1958).

My earlier studies of *Trichophaeopsis bicuspis* (Kanouse, 1958, p. 138; Korf and Erb, 1972) have led me to doubt some of the characters stressed by Gamundí in distinguishing her species. The shorter asci (170-200 µm *vs.* 250-280 µm) recorded by Gamundí for her species seems a very unsuitable character for this group, for I find great variation among collections. Hymenial color may be a better character, but is useless in dried specimens. In the only specimens I have personally collected, the hymenium was the bluish-gray described for *T. bicuspis*. *Trichophaea eguttulispora* differs in having the fresh hymenium "ochroleuco vel pallide avellaneo." The third character she emphasized, eguttulate *vs.* biguttulate ascospores, is shown to be rather one of a single, non-oleaginous inclusion *vs.* usually two such inclusions.

Gamundí for the first time noted and illustrated faintly punctate ascospores in her material in iodine mounts. I am able to confirm this also in typical *T. bicuspis*. In all collections of both taxa the ascospores have a double wall, the outer layer (perispore) yellowish in KOH-phloxine-glycerine mounts, and distinctly cyanophilic in cotton blue mounts. The punctations on the wall appear to be in the inner wall layer.

So many of the features of the two fungi are so similar that I am forced to consider them as representing a single species. Since I find no evidence of the young or mature spores of the Tierra del Fuego material having more than one inclusion, I am prepared to accept it as a geographical race, distinct in this respect from the European and North American *Trichophaeopsis bicuspis* subsp. *bicuspis* (the distribution so far as known to me from specimens is shown in FIG. 3).

TRICHOPHAEOPSIS BICUSPIS (Boudier) Korf & Erb, subsp. EGUTTULISPORA (Gamundí) Korf, *comb. & stat. nov.*

≡ *Trichophaea eguttulispora* Gamundí, Bol. Soc. Argent. Bot. 15: 85. 1973.

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NOMENCLATURAL NOTES. IX.
A MISCONCEPTION IN REGARD TO DASYSCYPHUS AND DASYSCYPHA

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Things are nowhere near as bleak for the citation of species of *Dasyscyphus* as Holm's (1976) recent analysis implies. He correctly noted that when I (Korf, 1954) discovered that *Dasyscyphus* 1821, a long-neglected post-starting-point name, had to be adopted for species usually assigned to the large genus *Dasyscypha* 1870 (or to *Lachnum* 1871), I believed that "*Dasyscypha* Fuckel [1870] should be considered merely an orthographic variant [of *Dasyscyphus* Gray 1821], and combinations using either spelling should be considered valid, thus avoiding wholesale name changes."

Though nearly all recent authors have now adopted *Dasyscyphus* instead of *Dasyscypha*, Holm finds my opinion "hardly tenable." His analysis is that *Dasyscyphus* Gray 1821 was lectotypified by Korf (1954) with *D. virgineus*. *Dasyscypha* Fuckel 1870 was, according to him, first lectotypified by Clements and Shear (1931) with *Dasyscypha cerinea*. There appear to him to be two solutions, either one of which results in chaos.

Holm's OPTION ONE: Treat these as orthographic variants, as I had proposed. They then become homonyms [presumably because they are based on different (lecto)types (Art. 64, Note)], and *Dasyscypha* 1870 becomes a validly published but illegitimate generic name. All epithets published under this generic name are themselves illegitimate, and moreoever he states that they could not be transferred to *Dasyscyphus* (his example: *Dasyscyphus cerineus* cannot be proposed for *Dasyscypha cerinea* since it would be an illegitimate later homonym of the already illegitimate *Dasyscypha cerinea*). Presumably wholesale creation of new names (epithets) would be required.

Holm's OPTION TWO: Consider *Dasyscyphus* and *Dasyscypha* to be different names, not mere orthographic variants. This would make it possible to transfer every epithet from *Dasyscypha* (a legitimate name, and later synonym) to *Dasyscyphus*. The dire result would be, of course, wholly new author citations for each such transfer.

Holm's MISCONCEPTION lies in his belief that *Dasyscypha* Fuckel 1870 is a correct author citation. Holm states that the name "was validly published without any reference to previous authors such as Fries' *Peziza* tribus *Dasyscyphae*, and must be considered as a new generic name judged on its own merits." I take serious issue with that conclusion, and believe that Holm's view will not stand scrutiny. When Fuckel (1870) erected *Dasyscypha* he included 7 species. Two of these were Fuckel's own taxa, with no bearing on any previous use of the generic name. But the first 5 species he lists, inclusive of 2 varieties and 1 subspecies, *all* appear in Fries's *Systema mycologicum* (1822) in that exact tribus *Dasyscyphae*. While it is true that Fuckel ascribed the generic name to himself, one cannot ignore the very clear, though indirect, reference to Fries's tribe demonstrated by his citation of those pages of the *Systema* in three separate entries; even the formula "PEZIZA Lachnea *Dasysc.*" heads each page pair where the 7 specific and infraspecific epithets appear in the *Systema*. Authors other than Holm have had little difficulty in interpretation of what Fuckel did and intended to do: they nearly universally cite the genus either as *Dasyscypha* Fr., or as *Dasyscypha* (Fr.) Fuckel, but not as *Dasyscypha* Fuckel. Even the authors Holm claims lectotypified the generic name so cite it.

If, as I hold, the generic name cannot be *Dasyscypha* Fuckel, we need to concern ourselves with how to cite it correctly. Clearly Fuckel knew of, and adopted, Fries's (1822) tribe name, which he raised to generic rank. But is Fries the author of *Dasyscyphae?* The evidence is clear: Fries also adopted it from an earlier author, Nees von Esenbeck (1817), as can be seen by his unequivocal reference to Nees's publication of *Dasyscyphi* (Fries, Syst. mycol. 2(1): 77. 1822). This is, of course, the same *Peziza* 'familia' *Dasyscyphi* Nees which Gray (1821) had also elevated to generic rank, using the masculine gender and spelling *Dasyscyphus* (Nees's *Dasyscyphi* would appear to be masculine plural).

Since *Dasyscyphus* (Nees : Fr.) ex Gray 1821 and *Dasyscypha* (Nees : Fr. ex Gray) Fuckel are both based on the same taxon, they *necessarily* have the same type, and are merely orthographic (spelling) variants. *Dasyscypha* is not an illegitimate later homonym, but an orthographic variant, a different spelling because of a choice in gender. No names are made illegitimate, and no transfers or new author citations need be invoked. The dire results from both of Holm's options have evaporated. Correction of gender from feminine to masculine (where needed) is all that is required. And Holm's suggestion that "the status of *Dasyscypha* as an orthographic variant or not should be settled by an appropriate authority such as the Special Committee for Fungi and Lichens" proves wholly unnecessary.

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NOMENCLATURAL NOTES. X.
TYPIFICATION OF RUTSTROEMIA: A REBUTTAL

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Holm (1976) has recently challenged the nomenclatural typification of three genera of inoperculate Discomycetes, *Dasyscypha, Helotium,* and *Rutstroemia.* With regard to this last, we completely disagree with his general comments that "an analysis of the case reveals that none of these species [currently being used as the type] seems eligible as a lectotype," and that there has been an "abortive attempt to typify the generic name by *R. bulgarioides.*"

Although not specifically stated we assume that Holm refers to the well-documented case made by Honey (1928) for lectotypification of *Rutstroemia* Karst. by *R. bulgarioides* (Rab.) Karst. which has been accepted and defended by Dumont and Korf (1971). A second typification of the generic name was made by Clements and Shear (1931), who chose *R. firma* (Pers. ex Gray) Karst. This typification was accepted and further elaborated upon by White (1941) in his monograph of *Rutstroemia.*

Rutstroemia was originally described by Karsten (1871) for 7 species, but he (Karsten, 1885) later abandoned the generic name and distributed 6 of the original 7 species in 4 genera *(Chlorosplenium, Sclerotinia, Helotium,* and *Ciboria).* The seventh species, *R. amentacea* (Balb.) Karst., was not included, "apparently by oversight" according to Holm. It is this oversight species which Holm has selected as the *one* species available as a possible lectotype, thus making *Rutstroemia* a taxonomic synonym of *Ciboria* Fckl. 1870. Holm has also concluded that 3 of the original 7 original species, *R. macilenta* Karst., *R. firma,* and *R. bulgarioides,* "are more or less disqualified from consideration for lectotypification." It thus appears that his only justification, although not specifically stated, for the selection of *R. amentacea* is based upon the "residual method" (International Code of Botanical Nomenclature: Guide for the Determination of Types, paragraph e).

We cannot agree with Holm that "more or less disqualified from consideration for lectotypification" is disqualification! A type species is, we are instructed by the Code, not taxonomically typical, but merely that element with which the name is nomenclaturally bound. True, Karsten did abandon his generic name 14 years after he erected it. But the name must be typified, and the Code (Art. 8) forces us to follow the *first* lectotypification unless certain problems arise. We cannot now accept still a third lectotype, *R. amentacea*, using the residual method when previously designated types (two!) exist. The residual method is for the designation of types of names that do not have previous lectotypification(s).

We have already discussed at length (Dumont and Korf, 1971) why we feel compelled to accept Honey's (1928) designation of *R. bulgarioides*. We do not believe that it can be proved that Honey used *only* the "simple first species rule" that Holm claims to have been the basis of his choice. We have pointed out in that paper that Honey weighed other elements in making his lectotypifications, and that therefore the choice may not be superceded under Article 8 of the Code under the rubric of a choice "made arbitrarily." Honey's typification was in no way "abortive."

Holm apparently overlooked or at least did not discuss the typification of *Rutstroemia* by Clements and Shear (1931) with *R. firma*, the same species accepted as lectotype by White (1941). If someone is convinced that Honey's typifications *can* be overthrown under Article 8, then the Clements and Shear designation must stand. In that case, *Rutstroemia* would become available as an older name for *Poculum* Vel. emend. Dumont (Dumont, 1972, 1976). We hold that the correct name for *R. firma* is *Poculum firmum* (Pers. ex Gray) Dumont. We retain *Rutstroemia* for a presumably monotypic genus based on *R. bulgarioides*. *Piceomphale* Svrček (1957), based on the same species, is a later synomym.

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NOTES ON PHIBALIS. II.

KIRSCHSTEIN'S ENCOELIA SUBGEN. VELUTARIA (= VELUTARINA) AND ITS DISTINCTION FROM PHIBALIS

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In a recent delimitation of the genus *Phibalis* Wallr. [≡ *Encoelia* (Fr.) Karst.], Korf & Kohn (1976) accommodate two of the three subgenera originally proposed by Kirschstein (1935) in his broad circumscription of *Encoelia*, subgen. *Euencoelia* and subgen. *Encoeliopsis* (as *Phibalis* subgen. *Phibalis* and subgen. *Kirschsteinia* Korf & Kohn, respectively). While we did not accept Kirschstein's subgenus *Ocellaria*, we reserved judgement on a later Kirschstein (1938) subgenus, *Encoelia* subgen. *Velutaria* (Fuckel) Kirschst., proposed to include *E. rufo-olivacea* (Alb. & Schw. ex Fr.) Kirschst., *E. cinereofusca* (Schw.) Kirschst., and a new species, *E. sitchensis* Kirschst. Subsequent study of these three species confirms assignment of generic rank to *Velutarina* Korf, to which the first species is currently referred.

Although *Velutarina rufo-olivacea* (Alb. & Schw. ex Fr.) Korf, the type species of *Velutarina*, with its tough, reviving, powdery apothecia bears superficial resemblance to those species placed in *Phibalis* subgen. *Phibalis*, microanatomical features do not suggest intrageneric affinities. *Velutarina* is distinguished by the presence of large (ca. 30 µm broad), vesicular cells, which in fresh material are filled with greenish sap (Korf, 1973). These inflated cells are borne abundantly on short lateral branches and on apices of the thick-walled medullary hyphae, detaching and becoming aggregated in the ectal excipulum to form the "Rosenkrantz" described by Rehm (1892) so evident along the margin. Although loose vesicular cells and rhomboidal crystals form a powdery excipulum reminiscent of *Phibalis*, the vesicular cells are borne throughout the medullary excipulum with little reorientation of hyphae to form the well-defined ectal excipulum so characteristic of *Phibalis*. The unique vesicular cells with their green sap and the simple tissue organization place *Velutarina* outside of our circumscription of *Phibalis*.

Another distinctive character noted by Korf (1973) and others is the browning and punctation in age of ascospores, observed in this study in all three of Kirschstein's species. Beaton and Weste (1976) interpret this as the breaking up of a brown exospore. We observed such spores only in asci with badly deteriorated discharge apparatus, suggesting that these are senescent spores which have failed to discharge.

Comparison of holotype material of *Encoelia sitchensis*,[1] and of a second collection also on dead branches of spruce (*Durand 2*, Bökeberg, Skåne, Sweden, 9.vii.1904, CUP-D 33-88), with several collections of *Velutarina rufo-olivacea* reveals that these two species are synonyms. *Picea* is to be added to the long list of substrata for this polyphagous species.

Although *Velutaria cinereo-fusca* (Schw.) Bres. *in* Voss is also, as Rehm (1912) suggested, morphologically indistinguishable from *V. rufo-olivacea*, it is unclear whether Schweinitz's specimen was an Ascomycete or a Basidiomycete. Saccardo (1881, 1888) first treated the species as a Basidiomycete in *Cyphella*, later (Saccardo 1889, 1892) as an Ascomycete in *Lachnella*, then in *Pezicula*. Bresadola (in Voss, 1891) thought it an Ascomycete, provided an expanded description, and assigned it to *Velutaria*. Seaver (1951) emphatically assigned Schweinitz's species to *Cyphella* in the Basidiomycetes. Cooke (1961) concluded that *Peziza cinereofusca* Schw. had been applied to two Basidiomycetes: *sensu* Saccardo (1881) for a Roumeguère exsiccatum it is *Phaeosolenia densa* (Berk.) Cooke, while *sensu* Cooke it is a true (basidiomycetous!) *Lachnella*, for which he coined the superfluous name, *L. myceliosa* W.B. Cooke. Since the original description is vague, and Cooke, the only author who comments on having examined Schweinitz's type, found "only an immature Pyrenomycete upon it," the problem is probably insoluble.

Worthy of note is the reaction in Melzer's reagent of all three "species." Bluing of the ascus pore is extremely faint after rehydration in water but is markedly enhanced by pretreatment with 2% KOH, a phenomenon reported previously in several other discomycetous genera by Kohn and Korf (1975) and by Nannfeldt (1976). The weak bluing, so much enhanced by KOH pretreatment, may explain contradictions concerning the iodine reaction in the literature. Rehm (1892) had distinguished *V. rufo-olivacea* and *V. cinereofusca* sensu Bresadola primarily on the basis of a J— reaction in the latter species. Twenty years later Rehm (1912) failed to comment on the iodine reaction and admitted that the two species are morphologically indistinguishable. While Beaton and Weste's (1976) description of a "positive, but rather faint" iodine reaction in *Velutarina rufo-olivacea* agrees with our observations, Dennis (1956) describes for the same species "a rather broad pore, stained deep blue in Melzer's reagent."

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[1] *Th. Rohde Hamm-Münden*, Auf abgestorbenen Stämmchen von *Picea sitchensis*, Schleswig-Holstein, Germany, viii.1936 (B).

After study of the type specimen of *Velutaria aeruginosa* Sacc. & Speg. *in* Saccardo (1878) [≡ *Lachnella aeruginosa* (Sacc. & Speg. *in* Sacc.) Sacc. & Speg. *in* Bizz.], I concur with Dixon (1974) that this species is also a synonym of *V. rufo-olivacea*. The host is *Vitis vinifera*.

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INDEX TO FUNGOUS AND LICHEN TAXA

This index includes genera, infrageneric taxa, species, and infraspecific taxa. New Taxa are in CAPITALS, and the pages where they are published are in *italics*. Sherwood's monograph of the Ostropalean fungi is separately indexed (pp. 271-277). Petersen's index to Bolton's "History of Fungusses" is itself an index (pp. 501-508). References to these indices are indicated by the notation *"see"*.

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ERRATA

Page 17, line 3: *for:* A = Crystalline layer.
read: D = Crystalline layer.

Page 60, line 27: *for:* a basal gelatinous appendage,
read: an apical gelatinous appendage,

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